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ABSTRACT

This book is the outcome of a research study on the impact of international cooperation on selected fields within Indian education, focusing on needs in the areas of teacher education, science education, and population education. Data sources for the study included published and unpublished printed materials and interviews with selected professionals. Three indicators of impact were used to assess the impact of international cooperation. Chapter 1, "The Background," provides the backdrop against which the investigation was conceived and developed. Chapter 2, "International Organizations/Agencies Involved in Education," provides an overview of the major international organizations involved in Indian education. Chapter 3, "Teacher Education," chapter 4, "Science Education," and chapter 5, "Population Education," describe innovations, projects, and programs initiated with international cooperation, noting the major findings in each area. Chapter 6, "Impact of International Cooperation," reviews the study, highlights major findings, and offers recommendations for further research, policy initiatives, and professional practice. (SM)

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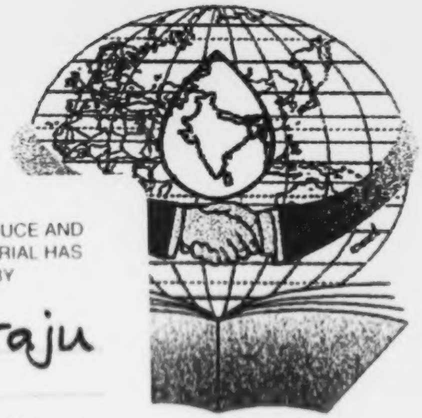

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IMPACT OF INTERNATIONAL CO-OPERATION ON SELECTED FIELDS OF INDIAN EDUCATION

Dr. RUKMINIYAMMA RAMARAJU

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ABOUT THE BOOK

International cooperation has become a fact of national life in a wide variety of fields. Indian education is no exception. Either in response to initiatives of other countries, or on its own, India has sought the assistance of International agencies in improving education. Agencies such as UNDP, USAID; UNESCO, UNICEF, UNFPA, and the British Council, have provided assistance in the form of know how, technology, training and development, and exchange of personnel. Systematic attempts to determine its impact have, however, been scarce. In order to optimize the gains from such cooperation, a country needs reliable guidelines for identifying, selecting, evaluating and operating projects and programmes born of such cooperation.

The impact of international cooperation in education is hard to assess, given the complexities of the variables involved. Educational outcomes do not lend themselves to quantification and measurement and do not manifest during a short period. Despite these limitations, the book brings out some important facts and relationships that can contribute to improving the effectiveness of international cooperation in the future.

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Dr. RUKMINIYAMMA RAMARAJU

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Dedicated To My Beloved Husband
Mr. Ramaraju Thirumalai
For His Sustained Inspiration,
Encouragement And Support

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FOREWORD

Eminent thinkers and scholars have predicted that the twenty- first century will be the century of the teaching profession- Century of the Teacher and Learner. The human race on this planet will endorse the grand vision propounded by the UNESCO International Commission on Education for the Twenty- First Century "Learning to Know, Learning to Be, Learning to Do and Learning to Live." Satellite communication technology, E- mail and Internet are progressively demolishing physical distance and barriers among nations. And yet, people continue to be divided and distanced as indicated by conflict, violence and intolerance in many parts of the world. The real challenge is to recapture the essential unity of mankind and realise the ancient dream of India- —वसुधैवकुटुम्बकम— (Vasudaivakutumkum) the whole world is one family.

Ms Rukmini Ramaraju's study of the impact of international co-operation on selected fields of Indian education makes a significant contribution to achieving this goal. Her analysis of the successes and failures of educational projects launched through international co-operation is most revealing and the lessons learned should result in optimising the gains from future projects. The present obsession with globalisation is fraught with challenges as well as opportunities. Globalisation has two dimensions, Competition and Cooperation. The first can be destructive; the second is essentially constructive.

Like a jewel in the crown of educational research in the last decades of the 20th century, Ms Rukmini Ramaraju's contribution deserves careful consideration by researchers and planners interested in international education and development through co-operation. She has brought credit to the Regional College of Education, Mysore, where she developed her professional competency with eminent scholars. All her colleagues and students in several institutions in India are proud of her achievements.

Findings of this study indicate that International Co-operation in teacher education, science education and population education has had mixed impact. This publication is a welcome addition to the literature on international education and co-operation. National agencies and professional organisations can also benefit from this research as they explore new dimensions of internationalism.

This valuable study by Ms Rukmini Ramaraju indicates bright future for international co-operation in the 21st century; and her effort will remain a landmark in our long journey to a happy and prosperous future for mankind.

G. Chaurasia

Bhopal

Date: 12-10-1998

G. CHAURASIA

PREFACE

International cooperation has become a fact of life in India's developmental efforts. Agreements and understandings (MoU) are being signed all the time with world bodies and specific national governments for a variety of forms of assistance toward developmental projects. Education, too, has figured prominently in these initiatives. USAID, UNDP, UNESCO, UNICEF, UNFPA, British Council, The World Bank, and others have provided substantial assistance for numerous projects in education.

Either in response to the initiatives of other countries, or on it's own, India sought the assistance of international agencies in improving education. In the areas of Teacher Education, Science Education and Population Education assistance has come in many forms depending upon the needs of the country and the special strengths and resources of the country offering it. Among the forms of assistance that India has sought and received are: knowledge of innovative programmes and techniques which have succeeded elsewhere and are promising; upgrading of teacher competencies through teacher exchanges, scholarships and fellowships; technology and equipment to support innovations and new programmes; and services of experts and specialists assigned to special projects to work in India with Indian counterparts for varying lengths of time.

Inspite of substantial international cooperation in education, no systematic attempt has been made to coordinate, review, evaluate and document such cooperation. No systematic study of the impact of such collaboration has been made. Research-based knowledge that can help establish useful guidelines for enhancing the effectiveness of international cooperation and, more importantly, for optimising the utilisation of India's scarce resources is in short supply.So a research study was undertaken by the author to address that need in the areas of Teacher Education, Science Education and Population Education.The study is limited to school education in these fields.

Printed materials published and unpublished were the major sources of data. These included reports and other publications of State agencies in India and abroad, of professional and voluntary organisations, both national and international, books, journals, research reports, annual reports, newsletters, bulletins, resource books, project studies, articles and abstracts. Interviews with selected educationists, educational administrators and researchers associated with international cooperation projects in the three areas helped the author to supplement documentary data. The three indicators of impact, identified in the operational definition, were used to assess the impact of international co-operation.

This publication is the outcome of that research study "Impact of International Cooperation on Selected Fields of Indian Education." for which Ph.D degree in Education was awarded to the author by the S.N.D.T. Women's University, Mumbai. The study was taken up under the guidance of Dr. Padmakar M. Sapre, Professor Emeritus, New York University.

Chapter I provides the background against which the investigation was conceived and developed. Chapter 2 provides an overview of the major international organisations involved in Indian education. Chapters 3,4,and 5 contain a description of innovations, projects and programmes initiated with international cooperation in the fields of Teacher Education, Science Education and Population Education, and the major findings in each. The last chapter 6 provides an overview of the study, highlights the major findings, and offers recommendations for further research, policy initiatives, and professional practice.

The author herself was the beneficiary of international cooperation. She obtained her professional degree in teaching at the Regional College of Education, Mysore,which is one of the important products of such a co-operation. She had participated in the teacher exchange prograqmme of USA, and was awarded Fulbright Travel grant. She had attended summer institute programmes in science conducted by National Science foundation, USA.

The author expresses her most sincere thanks to Dr. G Chaurasia for inspiring her to undertake this study and has agreed graciously to write the Foreword. She is greatly indebted to Dr. Padmakar M. Sapre Professor Emeritus, New York University for his scholarly guidance, constructive advice, significant suggestions in pursuing the research as well as in editing this publication.

The author is grateful to the authorities of the S.N.D.T. University for permitting her to publish her thesis.

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RUKMINIYAMMA RAMARAJU

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CHAPTER I

THE BACKGROUND

1.1. GLOBAL SITUATION FOLLOWING WORLD WAR II

Before the World War II (1939-1945), major areas of the globe were colonies of Britain, France, Spain, Denmark, Portugal and China. The colonial rulers had participated in the first Industrial Revolution brought about by the invention of the steam engine, electricity, telephone and further developments in science and technology. These rulers used to market the industrial products of their countries to their colonies and cart away the raw materials from these colonies. Thus they ensured protection of their industries and trade. To protect the colonial rulers' interest, the colonies were denied access to the prevailing scientific knowledge and technology available with them.

The entrepreneurship in the colonies for setting up industries and creating an infrastructure, by the local communities, was not encouraged. Various colonies under the same colonial rulers lived in isolation, without much contact, either with each other or with their rulers. The industry, education and agriculture were of primitive nature.

End of Isolation

The end of World War II marks the beginning of a new era in the global situation. The war, which was the mightiest struggle ever seen was both a boon and a bane to humanity. Around and during World War II, there was rapid development of science and technology in the industrialised countries, to improve the war machinery. This, in turn, revolutionized the knowledge and communication system and brought the world closer. People of all nations craved to have a better quality of life, which led to the emergence of bilateral and multilateral co-operation among nations.

Scientific inventions and discoveries in the fields of defence and medicine also emerged during this period. The advent of rockets, rocket launchers, submarine detectors, propeller aircraft and nuclear bombs helped to shorten the war. The discovery of penicillin, antibiotics and other medical advances in the use of blood plasma and pesticides like DDT were a great boon to the welfare of mankind and played a key role in increasing the longevity of men.

On the other hand, the war brought about six years of death, destruction and human suffering. Nuclear bombing caused mass destruction in the cities of Hiroshima and Nagasaki. Many cities and towns in Asia and Europe were ruined; the laboratories and libraries were razed to ground. Victorious nations realised that they owed a collective responsibility to safeguard the future species of the earth and co-operation of all nations is vital. This realisation resulted in the establishment of the United Nations as a world body to ensure universal peace and security. People of all nations have come to realise that, for world peace and progress, co-operation in various fields is essential.

Emergence of Newly Independent Countries

Immediately after the war, considering the demand for self-rule in colonies, the rulers realised that it would not be politically and administratively prudent and also not economical to continue the colonial rule. They realised that by relaxing the colonial rule gradually, they would gain the respect and sympathy of the people of the ruled states and also safeguard the existing trade and commerce which was vital for their own welfare.

The war also brought about a major change in the power structure of the world: the liquidation of the former empires of England and France and the emergence of new super powers, the USA, with its commitment to freedom, democracy and private enterprise, and the USSR, with its commitment to communism. Efforts to enlarge spheres of their influence and assume world leadership resulted in cold war between the USA and the USSR.

Most of the western nations, Japan and the emerging nations of the Middle East rallied around the USA, whereas Poland, Hungary, Czechoslovakia, East Germany, Cuba and Algeria aligned with the USSR. Most of the remaining countries of the world such as India, China, Yugoslavia, Egypt, Indonesia, Pakistan, Malaysia, South America and African countries stayed unaligned.

Increased Attention to the Need for Development

The revolution in the transportation and communication systems during the war time, such as expansion of air transport, extensive radio and microwave communication and emergence of electronics as a powerful tool gave access to people living in various remote parts of the world, to come into closer contacts. Thus the poverty and backwardness of the several developing nations came to the focus of world attention. The developing nations could also see the development and quality of life enjoyed by the industrial world, which was much in contrast to their utter poverty and backwardness. The countries which became independent and which were poor could no more reconcile to their lot. Desire of developing nations to improve their quality of life and to enjoy a better life was kindled.

The developed nations were awakened to their obligation of helping their less fortunate brothers of the newly independent countries and to improve their lot. For the first time, President Truman of the USA urged the developed nations to embark on a bold new programme for making the benefits of their scientific and industrial progress available for the improvement and growth of developing nations. Thus the world sympathy was stirred and a stage was set up to help the emerging independent countries with technical and financial help.

Apart from the sympathy towards the developing nations, the developed nations had an underlying self-interest. In order to sustain industrial and scientific development in their countries and to achieve better economic benefits, they wanted to increase world productivity and purchasing power and to create more stable conditions in the world for expanding their trade.

The two super powers, the USA and the USSR, who were vying with each other to establish their influence and political philosophy, realised that their effort would not be effective unless they assisted the developing nations in their own interest. They also realised that they could not expand trade and commerce unless they created a need for their products in the developing countries. This could be done only if the intelligentsia elite and enterpreneurs in the developing countries were encouraged by giving them access to Modern education and technology. Developing countries were encouraged to draw national development plans, with the assistance of experts from the developed countries.

Under the aegis of multinational organisations like the United Nations Educational Scientific and Cultural Organisations (UNESCO), the International Monetary Fund (IMF), the Asian Development Bank (ADB), the World Health Organisation (WHO) and the International Labour Organisation (ILO), many experts from developed countries participated with intellectuals, bureaucrats, industrialists and sociologists to frame developmental plans in the developing countries. The corner stones of these plans were higher education, transfer of technology and advanced management techniques since, only with the help of these, could the targets of their ambitious plans be achieved.

Concern for Population Explosion

The advancement of both preventive and curative medicine helped in the rapid growth of population in the world as a whole. The developed countries with their affluence and planned parenthood could sustain their population growth. For the newly emerged developing nations, the rapid growth of the population became a stumbling block in their planned developmental programmes. The rapid and unbalanced growth of population in the world resulted in widening the existing grievous inequalities between haves and have-nots. Terrorism, violence and crime were the outcomes, which are now threatening the whole world. These have to be tackled globally for universal benefit.

The growth of industries all over the world led to increased employment opportunities, which attracted more and more people towards the industrial centres. Concentration of industrial centres caused the expansion of urban centres on a phenomenal scale. As a consequence, people started exploiting the natural environment to satisfy their needs. Urbanization led to the exploitation of raw materials, energy feed stocks and water. Indiscriminate growth of industrialisation led to chopping of the forests and dumping of industrial and human wastes into rivers and seas, thus polluting the water. This has now led to ecological imbalance and environmental degradation.

Atmospheric pollution is due to vehicular emissions and industrial fumes. These fumes travel many miles in the air as per the wind flow patterns and after undergoing some chemical changes return to earth as acid rain, causing serious damage to crops, fresh water life and forests. Hence international cooperation is a necessity for the development of environmental friendly industries and agricultural practices in the entire world.

Apart from these, ecology, oceanography, medicine and science are not confined to any one nation. They are universal. Collective efforts of all nations are needed for the protection and conservation of ecology and oceanography and for further progress in science and medicine.

Advances in Science and Technology

Pesticides and insecticides of modern science, which helped to boost crop production to unprecedented levels, are now being discouraged since the discovery of their disastrous toxic effects. While industries have raised the standard of living, they have increased the level of pollution of water and soil, which is taking the toll of the health of mankind.

The invention of Television (T.V.), computers and other high technology products is an electronic marvel of the present day. It has elevated the quality of life in many ways. The T.V. has transformed our way of entertainment, has brought the whole world into our rooms. It is the best and the most effective mass media of information and communication and has the potential of propagating very effectively not only good but bad as well, thus causing social tensions.

The computer has revolutionised processing of information and is an asset to man in many of his activities. It has saved man time and labour in his routine physical and mental chores. It stores any amount of information, which is accessible to him whenever he wants.

Computers have made long held jobs redundant but at the same time have led to the creation of new jobs and thrown open more opportunities. On the other hand, they have raised a potential danger. Piracy of information can prove a threat to national security and personal freedom. Though the computer stimulates the brain, it can also lead to a blind dependence on it, leading to stunted mental growth if indiscriminately utilised. Thus a judicious usage of computers is called for.

Today more and more countries possess the knowledge of nuclear science, which has both constructive and destructive uses. The misuse of this knowledge by any one country can annihilate large parts of the world. Unless there is a genuine understanding and co-operation among nations and a commitment to prevent misuse, the nuclear sword hangs over the heads of humanity. Thus the advance in science and technology is a double-edged weapon. Knowledge without wisdom may prove fatal to the whole of mankind. So there is a need for sharing of knowledge and its proper use for the mutual benefit. This can be brought about only by international co-operation.

1.2. BEGINNING OF PLANNED DEVELOPMENT IN INDIA AND INTERNATIONAL CO-OPERATION

India's Commitment to National Development

At the threshold of independence, India's problems were numerous and varied. These included poverty, unemployment, under-employment, illiteracy, antiquated feudal land system, stagnated industry, mounting population, great economic inequalities, war affected economy, tragedy of partition and shortages of essential commodities. To come out of these staggering problems and to raise the people to their expectations was an uphill task for the national government. But India had its own assets too, and realised that by using and developing indigenous resources through planning, they could surmount these problems and march towards advancement.

India set up its Planning Commission in January 1950 soon after it adopted its Constitution as an Independent Democratic Republic. India committed itself to national development through a series of comprehensive five-year plans in agriculture, industry, rural development and social and defence sectors.

Recognition of the Importance of Education

In order to raise the living standard of its people, to increase the country's production, employment opportunities and national income, to cut through the poverty of the people and lift the stagnant economy, the Planning Commission's immediate task was to improve the economy. It was recognised that education was of basic importance in achieving economic development and social justice.

Education and economic growth are inter-related. Education is an investment in human capital. It has both qualitative and quantitative effect on economic growth. Knowledge and skill make people more productive, as they increase human capability. Knowledge has a multiplier effect and is not diminished by use. Education helps man in his economic growth, and the cumulative effect of such economic growth constitutes the wealth of a nation.

Today developed nations have a hundred percent literacy rate whereas illiteracy in various degrees is a common feature of the developing nations. This bears testimony to the fact that economic growth and education are inter dependent.

In Russia, in 1970, it was found that the people who had received primary education were one and a half times more productive than illiterate workers of the same age and doing the same work. People who had received secondary education were twice as productive while college graduates were four times as productive.

The caste system, though it served a positive social function in ancient and medieval India, became an instrument of exploitation of man by man. Religious fanatism encouraged communalism. Due to the impact of traditional social structures, females were deprived of equality with men in respect of types of education and job opportunities. The low castes, untouchables, tribals and rural poor suffered alienation, poverty, illiteracy, inferiority in status, and disease.

These inequalities acted as negative forces in the economic development of the country. National leaders such as Gandhi and Nehru realised that if India were to march forward, social equality among people has to be created. Discrimination on the basis of sex, caste, religion and class had to give way to equal opportunities. Education was seen as an instrument of national and social development.

India's constitution aimed to secure for all its citizens, justice, social equality, economic equality, liberty of thought, expression, belief, faith and worship, equality of status and of opportunity and to promote among them fraternity assuring the dignity of the individual and the unity of the nation.

Desire to Benefit from the Knowledge and Experience of Developed Countries

Development was a matter of greatest urgency to India. It could not wait a century to achieve national objectives. The knowledge, experience and achievement of developed countries were available. The developed nations too were eager to help the developing countries with technical knowledge and financial aid. Thus, the inter-dependency among nations became a reality after World War II, which led nations to forge agreements, alliances and exchanges in the fields of trade, business industry, defence, economics, health and education.

1.3. INTERNATIONAL CO-OPERATION IN EDUCATION

The colonial system of education, which India inherited at the dawn of independence from Britain, needed vigorous revamping. Education in India was lopsided, without any planned goals. It had no national character and was very outmoded.

If education had to be tuned to bring about qualitative changes, to make India a modern developing nation, it had to keep abreast of the scientific and professional knowledge of the developed nations and adapt them to Indian conditions.

To achieve these objectives, a variety of ideas, practices and programme have been introduced in education during the last four decades. With the help of co-operative endeavours with other countries, assistance has come from many of them through governmental as well as non-governmental agencies in the form of know-how, technology exchange and funding.

The University Commission (1948-49), the Secondary Education Commission (1952-1953) and the National Education Commission (1964-1966) which introduced many changes for the improvement of education in India had foreign subject experts, educationists and scientists on its panels in different capacities, to use their insight, experience and expertise. Apart from enlisting the help of experts from other developed countries, an education team was sent abroad for comparative study of the educational system in the USA, France, the Federal Republic of Germany & the USSR. Thus international cooperation was fully availed of by the educational commissions of India in framing the Indian educational policy.

UNESCO has influenced the educational policy of India to a large extent through the Indian National Commission for Cooperation with UNESCO. In addition, programmes like the Colombo Plan, the Commonwealth Co-operation Plan, the United States Fellowship programmes, and Fulbright programmes have promoted large-scale exchange of educationists, teachers and students with developed nations. India has also offered scholarships under several programmes for the foreign nationals to come and study in India.

The international collaboration in the field of education has been and also is, with various international agencies, such as UNESCO, UNICEF, UNDP, UNFPA, World Bank, etc., besides bilateral co-operation with countries such as the USA, the UK, the USSR, Germany, Netherlands, etc. several projects were initiated with their co-operation with a view to strengthen India's education system and to make an instrument of development.

In spite of large-scale international co-operation in education, no systematic attempt has been made to co-ordinate, review, evaluate and document such co-operation. There is a cell in the Ministry of Human Resource Development, which works as liaison for UNESCO. Their specific work is only channelising and monitoring the funding. No review is being made to evaluate the outcomes of co-operative projects. Information about the nature and extent of participation of international agencies is fragmented and inadequate. No systematic study of the impact of such collaboration could be found. This study was therefore, undertaken in response to that need in the areas of: (a) teacher education, (b) science education, and (c) population education. This study was limited to school education.

The three purposes of this study were: (1) to trace the evolution of international co-operation in the areas of teacher education, science education and population education, (2) to examine the nature, scope and activities of the programmes and projects launched in the three selected areas with international co-operation, and (3) to assess the impact of international cooperation in the three selected areas.

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CHAPTER II

INTERNATIONAL ORGANISATIONS/ AGENCIES INVOLVED IN EDUCATION

International co-operation in education for India began as a consequence of the country's commitment to national development through the instrument of comprehensive planning. Following the attainment of political freedom from British rule in 1947, India adopted a constitution that established fundamental rights and directive principles of state policy. The state assumed a leadership role in defining the goals of development as well as in creating the necessary infrastructure for achieving those goals.

Development is seen as a broad and integrated phenomenon that includes political, social, cultural and technological dimensions. While economic development is associated with a sense of urgency in a poor country, it cannot by itself raise the quality of life. A simultaneous attempt is called for to address such human needs as education and health. India's development plans have responded to these needs.

Educational reform and reconstruction have taken a variety of forms. Apart from the sheer increase in the number of educational institutions and programmes, in response to the growing needs and aspirations of people, the state has created a number of organizations and agencies to provide educational services. Both the central and state governments have expanded their role in providing and monitoring education in accordance with their respective constitutional responsibility. The private sector too has responded enthusiastically to the need for expanding and diversifying educational services.

A major feature of post-independence educational development in India is the emergence of international co-operation. Either in response to the initiatives of other countries or on its own, the Government of India has sought the assistance of international agencies in improving education.

International co-operation in education takes many forms. depending upon the needs of the country seeking assistance and the special strengths and resources of the country offering it. Among the forms of assistance that India has sought and received for strengthening teacher education, science education and population education are the following: knowledge of innovative programmes and techniques that have succeeded elsewhere and are promising; upgrading of teachers' competence through exchange, scholarships and fellowships, technology and equipment to support innovations and new programmes; and the services of experts and consultants assigned for special projects to work with their Indian counterparts for varying lengths of time.

Assistance under international co-operation comes from various sources. The major sources of assistance toward the three fields of Indian education addressed in this study are national governments and agencies of specific countries, international organisations, and non-governmental agencies and philanthropic organisations.

The nature and extent of assistance received toward teacher education, science education and population education in India is described in this chapter, under the three sources identified above.

— National Governments and Agencies

— International Organisations

— Non-governmental Agencies and Philanthropic Organisations.

2.1. ASSISTANCE FROM NATIONAL GOVERNMENTS AND AGENCIES

Assistance from national government follows the signing of bilateral agreements between two countries that wish to participate in development programmes. The agreements specify the fields of operation, as well as the nature and scope of assistance. India's bilateral cooperation in education is described below: -

BILATERAL CO-OPERATION WITH USA

The National Policy of Education of India is evolved on the recommendations of Indian University Commission 1948, Secondary Education Commission 1953 and Education Commission 1964. Many renowned educationists and education administrators from the USA actively participated in the deliberations of these commissions.

Dr. Arthur E. Morgan D.Sc., D. Eng., LL.D., Former President, Antioch College, First Chairman, Tennessee Valley Authority Community Service Inc., and Dr. John J. Tiger, M.A. (Oxon), LL.D., Ed.D. D.C.L., D. Litt., L.H.D., formerly Commissioner of Education of the US and President Emeritus of the University of Florida were the members of the University Education Commission (1948-49).

The Secondary Education Commission (1953) had on its panel Dr.Kenneth Rast Williams, Associate Director, Southern Regional Education Board, Atlanta (USA), as its member.

A galaxy of educationists of the USA provided valuable professional advice to the Education Commission (1964-65). Dr James E. Allen, Jr. Commissioner, State Education Department, and President, University of the State of New York, New York, USA; Dr. C. E. Beeby, Visiting Professor, Centre for Studies in Education and Development, Graduate School of Education, Harvard University, Cambridge, Massachusetts, USA; Prof. Andre Daniere, Centre for Studies in Education Development, Graduate School of Education, Harvard University, Cambridge, Massachusetts, USA.; Dr. Nicholas De Witt, Director, International Survey of Educational Development and Planning, Indiana University, Bloomington, Indiana, USA; Dr. John Guy Fowlkes, School of Education, University of Wisconsin, Madison, USA.; Dr. J. Paul Leonard, Professor of Education, Columbia University Teachers' College and Chief of Party, Columbia University Team in India, New Delhi.; Dr. Gordon N. Mackenzie, Professor of Education, Teachers' College Columbia University, New York, USA.: Dr. Frederick Seity, President, National Academy of Sciences, Washington, USA.; Prof. W.C. Smith, Professor of World Religions and Director, Centre for the Study of World Religions, Harvard University, Cambridge, Massachusetts, USA.: Prof. Edward A. Shils, Professor of Sociology & Social Thought, University of Chicago, USA. & Fellow of King's College, Cambridge, UK, were consultants to the Commission. Professor Roger Revelle, Dean of Research, University of California, USA, served the Commission as member.

USAID

USAID is a bilateral co-operation agency between the United States and another country, mostly one in which the United States has a special interest, and in areas of special U.S. competence. An increasing share of its co-operation is also channelled through multilateral agencies.The USAID plans its co-operation through sector analysis, that is planning is done in terms of the framework of the whole educational system and not projectwise..

The United States Agency for International Development (US AID) and the National Science Foundation (NSF), USA, collaborated with the UGC and the NCERT in organising Summer Science Institutes for nearly a decade, between 1963-1972, for secondary school teachers and intermediate & college teachers. The Summer Institutes were partly financed by USAID and technically assisted by American Consultants from Teachers' College, Columbia University, the Ohio State University, University of Houston and University of Wisconsin. The Indian adaptation projects undertaken to modify American science instruction material to suit Indian environment were also guided by American consultants and financially aided by USAID.

In 1963, the Regional College project was established with the assistance of USAID and the College of Education, the Ohio State University. The purpose of this project was to serve as an effective instrument for NCERT by providing leadership to secondary education in general and the multipurpose school programme in particular. Both financial and technical assistance was provided for the project period 1964 to 1969.

The Fulbright Programme

At the end of World War II, Senator Fulbright introduced a legislation, which made possible this U.S. Overseas educational exchange programme including teacher exchange programme. The Fulbright programme provides travel grants, stipends, tour and living expenses for the participants of both the countries. The Fulbright agreement for India was signed in 1950. Initially the programme was financed by foreign currency reserves of PL 480 fund. But today the programme is directly funded by the American taxpayer. Over the years, 7500 grantees, roughly half of them Indian benefited by this programme.

United States Educational Foundation in India (USEFI)

United States Educational Foundation in India (USEFI) was established under the US-India agreement on 2nd Feb 1950. USEFI is a binational organisation whose policies are set by a board consisting of representatives of the Indian and U.S. governments with headquarters at Delhi and regional offices at Bombay, Madras and Calcutta.

USEFI facilitates the administration of the educational programmes financed by the funds made available by the U.S. government financing studies, research, instructions and other educational activities, for citizens of both India and USA. Students, teachers, trainers, instructors, professors are the beneficiaries of the programme.

The following are the academic exchange programme, administered by USEFI:

(a) The Fulbright Fellowships for both Americans and Indians.

(b) East-West centre grants for Indians.

(c) The U.S. Department of Education summer projects for Americans.

In addition to the above programmes, USEFI also regularly conducts and offers funding for seminars, conferences and summer institutes of binational character around Indian and American academicians.

Along with USEFI, the American Studies Research Centre (ASRC) and the American Institute of Indian Studies (AIIS) are important institutions engaged in Indo-American educational exchange.

During 1984, Professor Bruce Joyce, Educational Innovator of Models of Teaching in USA, came to India under the USEFI scheme and conducted several lectures all over the country, orienting Indian educators in teaching strategies, which can be used to realise different instructional courses.

The investigator had the benefit of the Fulbright Award as an Exchange Teacher to the USA through the USEFI during 1966-68.

BILATERAL CO-OPERATION WITH UK

The Ministry of Overseas Development is the main provider of funds for British bilateral aid. A large portion of it is channeled through the British Council. Formerly, the co-operation aid used to be given to its ex-colonies like India but lately this has been extended to other developing countries as well. The co-operation used to be in the form of teacher education, technical and vocational education, English language teaching, Science and Maths teaching and, in general, help for modernisation of education. Presently, in promoting the educational techniques, priority is given to the poorest nations and to the poorest people in those nations.

The organisation, called the Centre for Educational Development Overseas, deals with curriculum and educational technology in evolving new ideas of learning, new teaching methods and new equipment.

Since the British ruled India for nearly 250 years, the university education in pre-independent India was guided by them in its nature, structure, content and administration, which were similar to the corresponding pattern of university education in UK.

The University Grants Commission (1953) is a nodal agency for university education in India. This was formed on the recommendations of the University Education Commission (1948-49). A great educationist of UK, Dr. (Sir) James F. Duff (M.A.) (Cantab), M.Ed.

(Manchester), LL.D. (Aberdeen), Vice Chancellor, University of Durham, was an active member of the commission.

The Secondary Education Commission (1953) appointed to examine the prevailing system of Secondary Education in the country and suggest measures for its re-organisation and improvement had on its panel of members, Principal John Christie, Jesus College, Oxford.

The Education Commission of 1964-66, which made a very comprehensive report at all levels of education and advised the Government of India on the national pattern of education and on the general principles and policies for the development of education at all stages and in all aspects, had the following educationists as members/ consultants on the commission :

Mr. H. L. Elvin, Director, Institute of Education, University of London, London, as the member of the Commission; Prof. P.M.S. Blackett, President of the Royal Society; Lord Robbins, Chairman of the Committee on Higher Education (1961- 63), UK; Sir Christopher Cox, Educational Advisor, Ministry of Overseas Development, UK; Sir Willis Jackson, Prof. of Electrical Engineering, Imperial College of Science and Technology, University of London, UK; Prof. C. A. Moser, London School of Economics under the Commonwealth Fund for Technical Co-operation and Prof. A. R. Prest, Professor of Economics and Public Finance, University of Manchester, Manchester, England.

BILATERAL CO-OPERATION WITH GERMANY

The Federal Republic of Germany has helped developing countries to establish educational institutions such as universities, colleges and research institutions. It has also worked for the modernisation of teaching methods and functional basic education. It co-operates with a number of multilateral and bilateral agencies and provides special grants for projects carried out by other organisations on a transfer basis.

The Federal Republic of Germany had given financial assistance and other assistance to the Indian team who went to Germany for comparative studies in formulating the educational policy 1964-66. It has encouraged several teachers to visit and gain field experience and study vocationalisation of education.

Improved Science Education in primary and middle schools in Madhya Pradesh(M.P) and Uttar Pradesh(U.P) is one of the technical co-operation projects between the Republic of Germany and the Republic of India. This project was to help improve science teaching by developing teaching materials, producing them and supplying them to schools in MP and UP.

BILATERAL CO-OPERATION WITH SWEDEN

Swedish bilateral co-operation gives priority to non-formal education, elementary education, vocational training, agricultural training and training of teachers and administrators in those fields. Its next priority is for secondary education, especially in science, technology and administration. The third priority is for college education. Sweden provides funds for jointly selected projects by other bilateral agencies for Friends in Trust System administered through UNESCO.

Professor S. Dedijer, Institute of Sociology, University of Lund, was a consultant to the Education Commission of 1964.

BILATERAL CO-OPERATION WITH NETHERLANDS

Netherlands' co-operation in education with other countries is known for its quality rather than quantity. It finances a large number of students of other countries in their countries of origin as well as in Netherlands, and in third countries as well. A substantial number of educational advisers and teachers are working in other countries.

BILATERAL CO-OPERATION WITH EAST EUROPEAN COUNTRIES AND USSR

The co-operation takes the form of inter-governmental agreements and also scientific and cultural co-operation plans between the interested countries. The basic principles guiding the co-operation between the countries are mutual benefit, equality of both parties and transfer of scientific, technical and production 'know-how' by the more developed countries to the less developed ones. They build higher secondary education establishments and vocational training centres in other countries and also send their teachers and instructors to those other countries.

The Soviet Union and Czechoslovakia have set up special higher educational establishments for training highly competent personnel from among citizens of Asian, African and Latin American countries. One such institute is the Patrice Lumamba Friendship University (1960) in the USSR which has large material and technical facilities, also attended by students and post-graduates of many countries in all disciplines of education.

Academician A. D. Alexandrov, Rector, University of Leningrad and Academician O.A. Reutov, Academy of Sciences, USSR, were consultants to the Education Commission 1964.

The NCERT collaborates with various East European countries such as Yugoslavia, Czechoslovakia and Rumania by sending its officers for observation cum study in the field of non-formal education, teacher education, science and maths education, instructional aids and to study the educational systems in these countries under the bilateral, cultural exchange programmes. The NCERT also deputes its officers to these countries for attending important international conferences, meetings and training programmes in the field of mathematics, population education, teaching aids, correspondence education, education related work and learning, teacher effectiveness, educational technology, etc.

BILATERAL CO-OPERATION WITH FRANCE

The Education Commission of 1964 had Rector J. Capelle, Formerly Director-General of Education in France, Paris, and Dr. Philip H. Coombs, Director, UNESCO Institute of Educational Planning, Paris, as consultants and Jean Thomas, Inspector General of Education, France, and formerly Assistant Director-General of UNESCO as member.

BILATERAL CO-OPERATION WITH JAPAN

Professor Sadatoshi Ihara, Professor of the First Faculty of Science and Technology, Waseda University, Tokyo, and Professor S. Okita, Executive Director, Japanese Economic Research Centre, Tokyo, and Special Advisor to the Minister of Economic Planning Agency, Government of Japan, served as member and consultant respectively on the Education Commission of 1964.

National Institute of Educational Research (NIER) of Japan Co-operates with UNESCO and 18 Asian Countries in meeting the Asian regional research needs.

BILATERAL CO-OPERATION WITH OTHER COUNTRIES

New Zealand, Switzerland, Norway, Denmark, Austria, Finland are also assisting the educational programmes by awarding scholarships and supplying experts in particular fields. India, UAE, Israel, Spain and other developing countries have programmes for assisting each other in the exchange of students and policy training facilities. India as well as Israel has helped African countries with training and study grants under bilateral cultural collaborations. Teachers were deputed to various countries for the study in the field of work experience, pedagogy, etc.

2.2 ASSISTANCE FROM INTERNATIONAL ORGANISATIONS

UNESCO

United Nations Educational, Scientific and Cultural Organisation (UNESCO) is a specialised agency of the United Nations, which encourages educational, scientific, cultural and communication co-operation, to increase understanding among nations. UNESCO was established in 1946 and has 180 members. (As on September 1995) UNESCO's Regional Office for Asia including Asia's centre for educational innovation and development is situated at Bangkok, Thailand. The Regional Office, Science and Technology for south and central Asia is at New Delhi.

UNESCO deals with aspects of education related to:

— "quality and relevance of university teaching and training, updating curricula;

— promotion of research and the setting up of scientific networks;

— linkages between the production and service sectors, between education and research institutions and industry;

— strengthening networks that collect and spread scientific and technological information;

— employment generation through technology transfer;

— development of human resources and national capacities with the aim of reducing the disparities between the industrialised world and the developing countries;

— interactions between the oceans, terrestrial ecosystems, freshwater systems and the lithosphere and the sustainable use of resources through the Organisation's environment programmes;

— updating of the scientific knowledge base to understand the relationship between population, environment and development;

— use of researches findings for the Management of Social Transformations (MOST) particularly with regard to cities;

— transmitting and updating the world's philosophical heritage and universality."[1]

In addition to giving advice on special subjects, UNESCO is called upon to advise in the formulation and implementation of educational policy of the country, if the country opts for its co-operation. UNESCO helps in giving technical assistance in supplying member countries with experts, who stay in the country for the period needed, and help to train the counterpart staff in running the institutions or pilot projects started in accordance with the wishes of that country. Advisory services are also provided by its specially trained staff.

UNESCO works with other multilateral and inter-governmental agencies which are sources of finance, such as UNICEF, UNDP, World Bank Group, International Bank of Reconstruction and Development (IBRDC) and International Development Association (IDA), in strengthening the educational systems, facilitating exchange of scholars, promoting scientific and technological knowledge and preserving the national cultural monuments, facilitating mutual enrichment of cultures by various programmes, all over the world. UNESCO has contributed at the pre-primary, primary and secondary levels of education and also with educational planning.

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[1] *UNESCO 50.* UNESCO, 8 Poorli Marg, New Delhi 110057.

India is a founder member of UNESCO, and it is also the first developing country to host the General Conference of UNESCO in 1956. During the 1960's, UNESCO assisted in institutional development by providing external assistance. Since then, its pattern of co-operation has changed to one of collaboration with a few projects in the fields of education and it mainly supports innovative programmes.[2]

The Education Commission, 1964, which was appointed to advise the Government of India on the general principles and policies for the development of education at all stages and in all aspects had on its committee Professor S. A. Shumovsky, Director, Methodological Division, Ministry of Higher and Secondary Education, RSFSR, Moscow and Professor of Physics, Moscow University as members of UNESCO.

The UNESCO Planning Commission, which visited India during December 1963 at the request of the Indian Government, was headed by the Professor S. G. Shapovalonko, an USSR expert. The mission consists of 9 members drawn from the USSR and the USA. The mission made a detailed study of maths and science education as it existed at that time in India and made a detailed report and recommendations for the improvement.

The UNESCO experts from the USSR guided and participated in the development of Secondary Science Teaching Project (SSTP), instruction material and training teachers. 49 Science educationists from NCERT were sent to USSR for various trainings in different aspects of curriculum development, pre-service and in-service training of science teachers. The services of eight experts were available at NCERT in developing curriculum for secondary schools, instructional materials, training of teachers and supply of science equipment for all the teaching training institutions and also supply of science kits to nearly 30,000 schools.

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[2] *United Nations in India, Partnership for Development*, ©1983, U.N. Published jointly by the U.N. Agencies in India in 1991. A Reference Annual Edited and Compiled by research and Reference Division, Publication Division, Ministry of Information of Broadcasting, Govt. of India.

The Centre for Educational Technology (CET) which was established in 1972 in NCERT, was a joint support project of UNDP — UNESCO Mission and provided equipment, experts and fellowships. A notable aspect of the collaboration was the pilot project SITE for large scale use of satellite television as an educational medium for teaching science to 47000 primary teachers in 24 days which otherwise would have taken 10 years.

Among the other fields of co-operation of UNESCO are, educational planning and management, low cost school buildings and vocational and technical education particularly related to urban areas.

UNESCO has participated in UNICEF assisted projects such as reforming primary level school curriculum, Nutrition, Health, Environmental Education and Sanitation (NHEES), a project addressing to both school children and the community.

Today, the work of UNESCO, New Delhi, is focused among other things on curriculum innovation and development and science for villages.

The National Population Education Project (NPEP) launched in India in April 1980 was funded by UNFPA with the technical assistance from UNESCO. The project was executed in two cycles 1980-85 and 1986-90, in all the States/UTs in India.

UNITED NATIONS CHILDREN'S FUND (UNICEF)

UNICEF was established in 1946 by the General Assembly of UN as a United Nations International Children's Emergency Fund to provide urgent relief to children in post-war Europe and China. It changed its focus in 1950 to emphasize programmes ,giving long term benefits to children everywhere, particularly those in developing countries. UNICEF's work is accompanied with voluntary contributions from government and non-government sources.

UNICEF is a specialised agency of UN and is jointly assisting UNESCO in many of its educational projects at the pre-primary,

primary and secondary levels of education. Presently, it is laying emphasis on elementary education, general welfare and women's and girls' education and non-formal education. It assists developing countries in their capacity building efforts to implement national welfare and development programmes for children and adolescents and focuses mainly on rural children and children in urban slums in the least developed countries.

India has the largest UNICEF programme of any country in the world. UNICEF started its work in India in 1949 with relief supplies such as skimmed milk powder, drugs, vaccines, etc. to the children to India, during drought and floods. During the next two decades nearly all the 5400 primary health centres and 38000 sub-centres have received UNICEF's help. In 1961, the UNICEF registered office for South Central Asia was established in New Delhi, incorporating the then existing UNICEF India office.

In 1964, UNICEF joined hands with UNESCO and the Government of India in the task of shaping and financially supporting a mutually agreed plan of operation, the re-organsation and expansion of the teaching of science to students throughout the school stage. "By 1978, over 48,000 'Science Kits' were supplied and 75,000 primary school teachers, teacher educators, science supervisors and craft instructors were trained. Books, equipment and tools were supplied to over 8000 teacher training schools. Nearly 10 million primary school children were benefited"[3]

During the fifth plan period 1974-78, UNICEF gave technical guidance for planning and financial assistance to the 'Project Nutrition, Health, Environmental Education and Sanitation (NHEES)' to educate both students of primary school and the community to solve the problems of nutrition, health and environmental sanitation existing in the community in the selected areas in the participating states and UTs.

UNITED NATIONS DEVELOPMENT PROGRAMME (UNDP)

The UNDP programme was established in 1965 by the General Assembly of United Nations. Its primary objective is to help the developing countries in their efforts to increase the wealth producing capabilities of their natural and human resources. It comprises representatives of 36 countries, 24 seats are filled by developing countries and 12 by economically more advanced countries.

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[3] Ibid

It is the world's largest source of great technical assistance to developing countries. It works with more than 150 governments and 36 international agencies to accelerate their economic growth and improve their standards of living throughout the world. It annually supports about 5000 projects in the developing countries in Asia, Africa, Latin America and parts of Europe to the tune of $ 500 million annually. Most of the work is carried out under the umbrella of United Nations and its agencies or the government of the country concerned.

It assists in (a) locating, assessing and developing latent natural resources, (b) catalysing investment to realise development of natural resources and other assets, (c) support for professional and applied technology, (d) stimulating expansion of scientific research, (e) supporting national and regional development planning.

UNDP has assisted in the setting up of urgent priority projects of economic development such as technology institutions, technical training and university and second level education.

It provides funds for development of teacher training, both at primary and secondary levels of education, institution building, science and technology and work-oriented literacy.

UNDP's association with India is from the year 1949, and it has provided India with small-scale technical assistance under the Expanded Programme of Technical Assistance (EPTA). This programme merged with United Nations Special Fund (UNSF) to form UNDP. India's first contribution of $ 2,50,000 to the UNDP programme was in the year 1951. "Among the developing countries India's contribution to UNDP is the largest amounting to $ 7.6 million by 1983. The relationship between India and UNDP is one of mutual collaboration for development. It has provided a large number of experts in a variety of disciplines to work with UNDP funded projects in other countries and it also receives nearly 300 fellows for training in a variety of fields"[4] It also hosts many regional projects involving UNDP inputs.

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[4] Ibid.

At the request of the Government of India, during 1963 the UNESCO Planning Commission visited India under the UNDP Technical Assistance Project so as to advise the Indian Government on the desirable form of science and mathematics education at school stage. The mission made a thorough study of the status of science and mathematics education at secondary school level in the country and gave a comprehensive report and recommendations for the improvement and future planning.

In the year 1972, the Centre of Educational Technology (CET) was established with the joint support of UNDP and UNESCO. The support was given in the form of equipment, experts and fellowships. A three-year INSAT programme for education was launched in 1984 with the co-operation of UNDP, Centre Institute of Educational Technology(CIET), NCERT and Ministry of Human Resource Development. UNDP has provided over $ 2 million for CET in the form of consultants, fellowships, study grants and equipment. "The UNDP-INDIA partnership for developments has been a symbiosis, which has yielded significant benefits".[5]

THE COLOMBO PLAN

Seven Commonwealth countries founded the Colombo Plan in 1950. It was subsequently joined by more countries in Asia and the Pacific region, the USA and Japan (27 members). The Colombo Plan is a loosely knit organisation. It does not get policy initiatives and funds other than individual members.

Ministries, at their consultative meeting, agree upon the basic principles and policies governing assistance under the plan. Specific aid programmes are then negotiated bilaterally between the donor and the receiving country, within the framework of the policies adopted.

Capital aid comes in the form of grants and loans for national projects mainly from six developed member countries to the developing member countries of the plan, in the fields of agriculture, communication, energy and education.

Under technical co-operation, expert and intra-regional training are provided, training fellowships are awarded and equipment for training and research is supplied in the fields of agriculture, industry, planning, education and health. Japan, the UK and Australia, provide fellowship awards. India is one of the beneficiaries of the programme. Under this plan the UK supplied educational films on science subjects.

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[5] Ibid

COMMONWEALTH EDUCATION CO-OPERATION PLAN

The plan was evolved at Oxford in 1959. The four-pronged plan relates to;

(a) Commonwealth Scholarship/Fellowship,

(b) Training of Teachers,

(c) Supply of teachers for service in countries of the commonwealth other than their own.

(d) Technical Education.

The plan is intended to initiate constructive efforts for sharing resources to ever-greater advantage so that all the peoples of the commonwealth could acquire benefit and the bonds that bring them together would be strengthened by the mutual asssitance.

Many Indian educational specialists are the beneficiaries of the programme.

COMMONWEALTH FUND FOR TECHNICAL COOPERATION

The Commonwealth Fund for Technical Co-operation is a similar type of organisation as the Colombo Plan. Its main contributors are the UK and Canada, apart from 17 Commonwealth countries. Some part of its assistance is earmarked for education in the form of the Commonwealth Scholarship and Bursary Scheme.

Under the Commonwealth Teaching Training Bursaries offered by the Government of the UK, 50 Indian teachers are sent to UK against 50 Bursars for training in methods of teaching, writing, production, and distribution of text books and also training of youth leaders at institutes of education. All tuition costs, full boarding and lodging charges, plus pocket money for residential courses and maintenance charges for non-residential courses are met by the UK Government.

The studies available at the UK under the scheme are:

(a) Courses in the teaching of English as a second language.

(b) One year course in Secondary Education in Tropical Countries.

(c) One year course of teachers of Mathematics or Science or Geography.

(d) One year course in the teaching of handicapped children.

(e) One year course in school organisation and administration.

(f) One year course for training college lecturers or teachers concerned with training teachers in science.

(g) One year specialists' course for teachers of the Blind.

(h) One year specialists' course for teachers of the Deaf.

(i) One year course in the teaching of sub-normal children.

(j) One year course for training in writing, production and distribution of text books.

(k) One academic year full time courses for teachers of technical, commercial and general subjects in technical colleges.

(l) Courses extending over one year for teachers in the subjects of building, engineering, science and general subjects.

(m) Training courses of one academic year of teachers in commerce, science and technology.

(n) Courses for men and women who wish to become professional youth workers.

During the years 1956-57, many Indian Science Teachers were deputed to Britain for a study-cum-training course under the programme 'Strengthening of Science Teaching in Secondary Schools'.

In the year 1975, the British Council collaborated with Sterling University and sent a number of experts from Ulster, Scotland, to conduct workshops in micro-teaching in the states of Maharashtra and Tamil Nadu.

UNITED NATIONS POPULATION FUND (UNFPA)

The United Nations Fund for Population Activities, started in the year 1969, is an organ of the United Nations General Assembly, with the UNDP governing council as its governing body. In 1987, its name was changed to United Nations Population Fund (retaining the same acronym).

UNFPA today is the largest internationally funded source, for assisting population programmes in developing countries:[6]

(a) To build up the capacity to respond to needs in population problem in developed and developing countries.

(b) To find possible strategies and assist the developing countries to deal with the population problems at their request.

The National Population Education Project (NPEP) launched in April, 1980 by the UNESCO was executed in two cycles, 1980-85, and1986-90, in all the states/UTs in India. The primary goal of NPEP was to gear the entire educational system in the country to the realisation of the potential role of education in the developmental efforts of the country and of the inter-relationship between population education and different aspects of quality of life at micro and macro levels. Under this programme, the elements of population education are integrated into various disciplines at all levels of education.

2.3 ASSISTANCE FROM NON-GOVERNMENT AND PHILANTHROPIC FOUNDATIONS

THE FORD FOUNDATION

It is a charitable foundation, founded in 1936 by Henry and Edsel Ford of U.S.A. support education.

It supports conferences, seminars, exchange programmes, consulting services, program-related investments, publications, research, seed money, technical assistance, continuing support, endorsement funds, fellowships grants to individuals, improvements in university and secondary education by providing funds to equip laboratories and libraries. At present it's help encompasses U.S., Middle East Asia. Latin America and Caribbean.

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[6] *The Europe: World Year Book*, 1995, Vol. 1, 36th edition International Organizations.

In the year 1955, the Ford Foundation assisted the All India Council of Secondary Education, Ministry of Education in implementing 23 extension service projects in graduate training institutes to provide in-service training to teachers through seminars, workshops and conferences and exhibitions. It also assisted in deputing science teachers to different countries like USA, UK and Canada under the programme 'The Strengthening of Science Teaching in Secondary Schools and Staff.'

2.4 ASIAN CENTRE OF EDUCATIONAL INNOVATION FOR DEVELOPMENT (ACEID)

ACEID was set up by UNESCO in UNESCO's Regional Office for Education in Asia and Oceania in Bangkok in the year 1973, on the request of the members of the Asian National Commissions for UNESCO, to facilitate the implementation of APEID, a new pattern of regional collaboration among the member states.

APEID, the Asian and Pacific Programme of Educational Innovation for Development, is an organisational innovation of UNESCO effecting co-operation in education, where participating member countries co-operate, develop and implement mutually beneficial educational programmes and activities. Its primary goal is to contribute to the building up of national capabilities for undertaking education innovations linked to the problem of national development, thereby improving the quality of life of the people in the member countries.

UNESCO, UNDP and voluntary contributions from participating member states financially support the programme APEID. In addition, there are contributions in kind by all the member states.

As on January 1989,there are twenty-six member countries participating in APEID. They are Afghanistan, Australia, Bangladesh. Bhutan, China, Fiji, India, Indonesia, Iran, Japan, Lao People's Democratic Republic, Malaysia, Maldives, Nepal, New Zealand, Pakistan, Papua New Guinea, Philippines, Republic of Korea, Samoa, Socialist Republic of Vietnam, Srilanka, Thailand, Tonga, Turkey, and USSR.

APEID works through National Development Groups (NDGs), Associated Centres and ACIED.The NDGs and the Associated Centres co-operate inter alia in development of the work plans of APEID and their implementation. The work plans are developed for programme cycles of 4 to 5 year's duration.

National Development Groups (NDGs)[7]

National Development Groups (NDG) constitutes, within a member country, the key structure of APEID, (a) for promoting innovations in the country, (b) for co-ordinating various inter-country activities and (c) for participating in the various programmes of the APEID.

Associated Centres[8]

The Associated Centres are institutions/organisations of member states, which are associated with APEID at the instance of the concerned Governments. They participate in the programme for mutual benefit, in exchanging insights, skills and experience promoted under the programme. They also co-ordinate the other national projects in the area. As on January 1989, there were altogether 185 Associated Centres of APEID.

ACIED[9]

ACEID, functions as an inter-disciplinary task force,a) facilitating inter-country co-operative action, b) serving as a catalytic agent for stimulating innovations, in the countries c) identifying gaps and growth points in national efforts. It also develops information materials and promotes the exchange of educational media resource.

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[7] *NDG Secretariat, International Relation Unit, APEID*, National Council of Educational Research and Training, New Delhi.

[8] Ibid.

[9] UNESCO Principal Regional Office for Asia and the Pacific 1989 Asia and Pacific Programme of Educational Innovation for Development, *APEID in Brief.*

Regional Consulting Meeting (RCM)

These meetings are held periodically for the review of APEID and for developing new activities. The Chairman of the National Development Groups (NDG) or Senior Educational Administration and Selected Heads of Associated Centres attend these meetings. These meetings provide APEID with feedback and bring future actions in focus and instil urgency in APEID's ongoing projects. Apart from this, RCM also identifies areas of concentration. The methods of work for co-operation include:

(a) Mobile Task Force: The APEID staff consists of experts who combine to form interdisciplinary task forces. They provide technical and consultant services and also training to the associated national centres, in the development of the programme.

(b) Technical Working Groups: To take care of technical aspect of the various projects, technical groups are formed to help to process their implementation. The specialists from the member states are enlisted for these groups.

(c) Workshops, Seminars and Training Courses: Workshops, Seminars, Study groups, Regional Consultancy meetings, form the integral part of the development and implementation of the programme. Training courses depending upon the programme design are organised, in associated centres with the technical support of ACEID's mobile task force.

(d) Pilot Experimental Projects: Pilot Experimental Projects are conducted through a systematic application of the procedures of disciplined enquiry, experimentation, evaluation, development and diffusion. Inter-country visits are made for sharing the experiences and also for critical assessment of experiences in innovations.

The activities under the programme are organised and carried out in close co-operation with the international bodies who are involved in the project of the member states of the region and pursuing similar objectives and also other appropriate organisations.

Publications

ACEID brings out newsletters at regular intervals. It also brings out reports of inter-country. APEID meetings and of those conducted at national levels, APEID's work plans both inter-country and national documents on available facilities and needs for staff training of associated centres. Member countries of APEID prepare their own national inventories of innovations, which they have introduced in their own educational systems. The summaries of the selected ones are published in an Inventory of Educational Innovations in Asia and Oceania.

ACEID develops independent literature on various APEID themes. Regional Education Media Resources Exchange Service (REMRES) established as a part of ACEID, promotes the flow of information both to APEID and to its member countries.

Work Plans of APEID

APEID develops work plans for each 'programming cycle'. Programme Development Meetings get these work plans, prepared by the specialists from the member countries that are developed in Regional Consultation Meetings. The programme is reviewed by member states through the Regional Consultation Process and towards the end of each cycle, the programme is evaluated before developing the new activities by the participating member countries for the subsequent cycles.

The following are the programme areas developed till 1991:

First cycle (1974-1977): New orientations and structures in education; Management of educational innovation; Curriculum development; Educational technology; New structures and methods in teacher training; Science education.

Second cycle (1978-1981): Non-formal and alternative structures in education; Administration and management of educational innovation; Curriculum development; Educational technology; Training of teachers, teacher educators, and other educational personnel; Science (including mathematics), and technology education; Vocational and technical education.

Third cycle (1982-1986): Universalisation of education; Access to education at first level by both formal and non-formal means; Education for promotion of scientific and technological competence and creativity; Education and work; Education and rural development;

Educational technology; Professional support services and training of educational personnel; Co-operative studies and innovative projects of research and research based experiments related to educational development.

Fourth cycle (1987-1991): Universalisation of primary education; Continuing education; Education and the world of work; Restructuring secondary education; Educational and communication technology; Professional training including professional support services and distance education; Science and technology education.

INDIA AND APEID

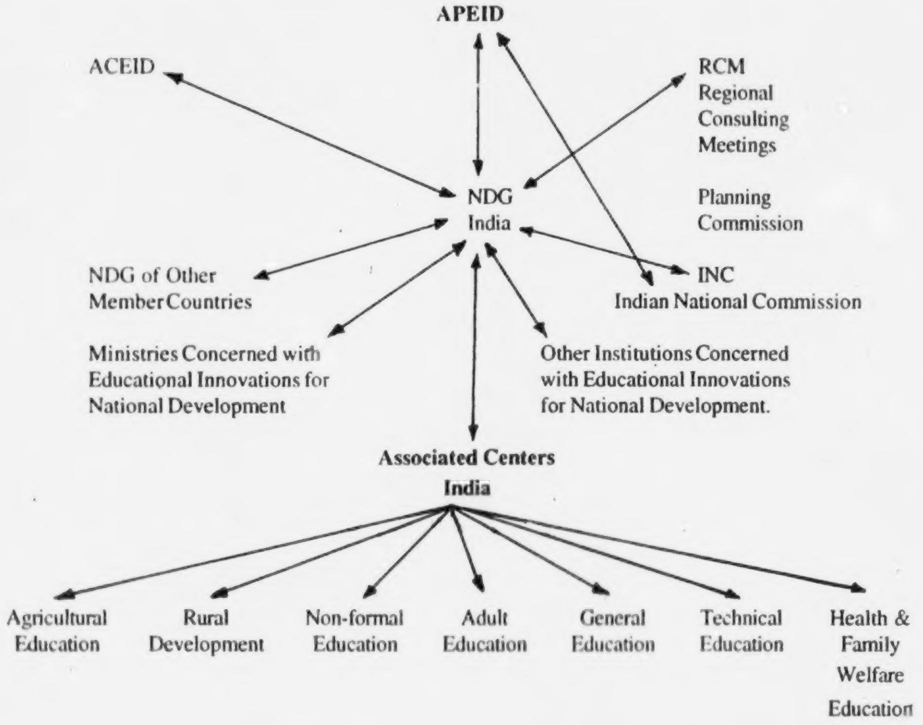
India is one of the founder members of APEID. In the year 1974, two national level institutes National Council of Educational Research and Training (NCERT) and National Institute of Educational Planning and Administration (NIEPA) were selected as Associated Centres. At present there are 17 Associated centres of APEID, representing the following development sectors: General Education; Non-formal Education; Adult Education; Technical Education; Health and family welfare education; Agricultural education; Rural Development. The Associated Centers of APEID are directly responsible for disseminating their own innovative programmes.

The Director, NCERT, New Delhi, acts as Ex-officer Member Secretary of NDG.in India. The Secretary to the Govt. of India Ministry of Human Resource Development is the chairperson of NDG. The Heads of the Associated Centres of APEID in India are the members of NDG.Besides these, some senior professionals or administrators from different ministries or organisations in different development sectors like Education, Health & Family welfare, Rural development and planning committee are associated with the programmes of NDG. The NDG Secretariat is located in the International Relation Unit, NCERT, and New Delhi. NDG provides forum for National Regional Seminars on Educational Innovations, and disseminates information on significant innovations through its quarterly newsletter "Educational Innovation".

The NDG of the countries discuss the guidelines of the work plan of the APEID and identify the major areas of concentration at the national level. NDG requests Associated Centres to take necessary steps in formulating joint innovative/research projects and also to undertake action research at the grass roots level.

APEID activities are also linked with on going national innovative projects and utilise the APEID inputs in solving some of the critical problems, which have otherwise impeded the implementation of national innovative project.

Fig. 2.1: Linkages with Organizational Institutes in the APEID Network


APEID
ACEID
RCM
Regional
Consulting
Meetings
NDG
India
Planning
Commission
NDG of Other
MemberCountries
INC
Indian National Commission
Ministries Concerned with
Educational Innovations for
National Development
Other Institutions Concerned
with Educational Innovations
for National Development.
Associated Centers
India
Agricultural
Education
Rural
Development
Non-formal
Education
Adult
Education
General
Education
Technical
Education
Health &
Family
Welfare
Education

[*Source:* NDG Secretariat International Relations Unit, NCERT, New Delhi 110016]

Teacher education and science education are two of the thrust areas of activities of APEID. The co-operation activities of APEID in India in respect of these two areas are discussed in depth in Chapter III and Chapter IV of this research study.

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CHAPTER III

TEACHER EDUCATION

3.1 EVOLUTION OF TEACHER EDUCATION IN INDIA

Ancient India (2000 BC-647 AD)

In ancient India, the teacher occupied a most revered position, for having both spiritual and temporal knowledge, and for being a person of high moral qualities. He practiced what he professed and was always an example to the society he lived in. For him, scholarship was not a matter of pride but of conviction.

In ancient times, often referred to as the Vedic Period, such teachers were most sought after by disciples. The freedom of accepting his disciples rested with the teacher. Once he was accepted, his development became a moral binding on the teacher. Self-realization through spiritual pursuits and religion was the aim of education. The students stayed with the Guru in Gurukula for a period of eight years from the age of 8 years. Knowledge was conveyed through the spoken word and elaborate explanations were given to help students understand. Later, when knowledge was in the form of Suthras, the teacher used parables from nature and stories to bring out their philosophical meaning. The disciples carried on this method of transmission when they became teachers. By their ingenuity and cleverness, they made the teaching interesting and meaningful by following these steps: listening to the spoken word, apprehension of the meaning of the spoken word, reasoning leading to generalization and confirmation by a teacher or a friend and finally application. This tradition came to be known as the 'Guru shishya parampara'. Sanskrit was the language used in teaching. During later stages of the Vedic period, the society was divided into four castes viz., Brahmanas, Kshatriyas, Vaishyas & Sudras. Teaching became the hereditary profession of Brahmanas.

Buddhist Period (647 AD-1200 AD)

During this period, the education system used to be monastic. Relationship between upajihaya (preceptor) and novice (disciple) continued as in the Vedic period. Development of new fields of knowledge like medicine, veterinary science and astronomy resulted in the emergence of highly specialised teachers. Other techniques of teaching such as exposition, debate, discussion, question and answer, use of stories and parables were developed. The inductive method and reasoning characterised the methodology of teaching. The language used was Pali.

Medieval Period (1200 AD-1765 AD)

During the medieval period also, teachers were held in high esteem and commanded universal respect. Relationship between the teacher and the taught was based on mutual love and respect. Muslims in India founded Maktabs, Madrassahs and Libraries. Maktabs imparted instructions in reading, writing and simple arithmetic, besides Koran education. The Madrassahs taught grammar, rhetoric, theology, metaphysics, literature, jurisprudence and science. They also taught subjects like commerce, agriculture, medicine, astronomy, ethics, algebra and geometry. Scholastic training and technical training went hand in hand. The medium of teaching was Persian but the study of Arabic was compulsory because it was the language of the Koran. Though oral method was very much in vogue, King Akbar in his Ain-i-Akbari insisted on writing the alphabets first, before they were committed to memory. He encouraged understanding of the subject and self-study. Good and able students were appointed as tutors to teach the juniors in the absence of teachers. Analytical and inductive methods were used in teaching subjects like logic, religion, philosophy and politics. Self-study was also one of the methods used.

Modern Period (1765 Onwards)

In the early part of the 16th century, Westerners started coming to India as traders. European missionaries started schools and initiated teacher training. In 1716, the Danish mission under the leadership of Ziegenbalg opened an institution for the training of teachers apart from two charity schools for Portuguese and Tamil children. Caray, Marshman and Ward started a normal school in Serampore for the training of teachers.

The monitorial system, which got exported to England by one Dr.Andrew Bell and was used as the Bell Lancaster system, was reintroduced in India towards the end of the 18th century. Mr. Campbell, the Collector of Bellary in his minutes dated 17th August 1723 had commended the system. He says, "the economy with which children are taught to write in native schools, and the system by which the more advanced scholars are caused to teach the less advanced and at the same time to confirm their knowledge is certainly admirable, and has well deserved the imitation it has received in England."[10]

During the early part of 1800s, school societies and schoolbook societies established schools for the training of teachers in Calcutta, Bombay and Madras. Sir Thomas Munro made recommendations for the increase of the allowances of teachers, printing of books on rules and regulations on the management of schools and improved methods of teaching.

An organised and systematic programme of training of teachers by the British Government was launched in 1826 when the first normal school was established at Madras. This was followed by Bombay in 1847 and Calcutta in 1849.

The following review of reports and recommendations of different committees and commissions given from time to time help understand the background of the evolution of the teacher training programme as it exists today.

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[10] U.N. Dixit, *Focal Points in the Development of Teacher Education*. Teacher Education in India- A Resource Book, Publication Department, NCERT, New Delhi, 1990, 28, 29.

Woods Despatch (1854)

This despatch is one of the important documents in the improvement of teacher education and was implemented in December 1854. It called for the: (a) establishment of training schools in each presidency, (b) institution of a pupil teacher system, (c) grant of stipend to pupil teachers, (d) small payment to teachers, (e) award of certificate to candidates on completion of the training programme and (f) provision of employment.

The implementation of the above recommendations encouraged the establishment of four normal schools: one in Bengal and one at Benares for training vernacular school teachers and one each at Madras and Bombay for training Anglo-vernacular and vernacular school teachers.

Hunter Commission (1882)

The Indian Education Commission 1882, (Hunter Commission) examined the existing system of public instruction and made the following important recommendations:

(1) Provide adequate number of normal schools to cater to the local requirements of all primary schools, both Govt. and aided, within the division under each inspector.

(2) Establish pedagogical courses.

(3) Conduct examinations in the principles and practice of teaching.

(4) Institute examinations and certification of successful completion of teacher training as a condition for permanent employment.

(5) Introduce shorter courses of training for graduates.

Based on these recommendations, 116 training institutions for men and 15 for women had been established by the year 1892. Theory and training went hand in hand in these colleges. The art of teaching was exemplified by model lessons given by students. Criticism of the lessons was used to improve them and the principles enunciated in the lectures were applied to actual schoolwork.

Education Policy of 1904

In the light of re-thinking on the syllabus and improvement of facilities in training schools and colleges, the Govt. of India Resolution on Education Policy 1904 put forth the following requirements:

(1) Enlist men/women of ability and experience to teach in training colleges.

(2) Equip training colleges with facilities, well-trained teachers, museum and library.

(3) Make the duration of the training programme two years for non-graduates and one year for graduates.

(4) Include content knowledge, principles of teaching and practical skill in the curriculum.

(5) Link theory with practice and provide practising schools attached to each training college.

(6) Award B.T. degree or a Diploma at the end of the training period.

(7) Bring together the training colleges, practising schools, and the inspectorate so that the influence of training is felt in the schools.

The Resolution also recommended a minimum of two years training specially suited to teach rural children so that the curriculum can be local specific

Resolution of Govt. of India 1913

This Resolution focused on periodical revision and improvement of courses. It suggested an optimum size for a practising school as well as a training college. It laid particular stress on teaching methodology, educational history and psychology and the content of the special subject. It suggested for the first time the inclusion of manual training, experimental science and internal assessment. It encouraged the constant exchange of ideas among the staff members of training colleges.

Calcutta University Commission 1917 (Saddler Commission)

The commission pointed out the inadequacy of training colleges both in content and training. It stressed that the training should bring out not only a good class teacher but also a good administrator. It recommended the introduction of education as a subject in B.A. and a post graduate degree in education. Its other recommendations were:

(1) Open a department of education in universities.

(2) Equip the department with a professor, a reader and a number of assistants.

(3) Collaborate with other departments of disciplines like psychology, history, philosophy and economics.

(4) Establish a demonstration school administered by the university to serve as a laboratory for educational experiments.

(5) Bring out publications and promote research.

(6) Facilitate the professional growth of teachers who are already in service.

The commission's recommendations resulted in opening a faculty of education in the University of Mysore (1925), Andhra University (1932) and Bombay University (1936). By the year 1932, thirteen out of eighteen universities had created the faculty of education.

The Hartog Committee (1929)

Though this committee was concerned mainly with primary education, it touched upon the important aspects of secondary education as well. It took notice of the poor quality of teachers and their training. It said, "the period of training is too short, the curriculum too narrow and teaching staff inadequately qualified."[11] It suggested journals in vernacular, refresher courses, conferences and teachers' associations to improve the quality of teachers. The committee emphasized the need for good teacher training for all levels of teachers and of a longer duration than just nine months for graduate teachers.

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[11] Ibid., 33.

The Abbot-Wood Report (1937)

This report is a milestone in the history of education. Though it was concerned mainly with vocational education, it suggested that a teacher should be proud of his vocation. Besides knowing the history of his own country and its educational effort, he should understand the social problems of the local community, the needs of young children and techniques of instructing them. It suggested three years of teachers training which would include one year of general education after the candidate finished lower level school. For the first time, concepts of social responsibility and community service were brought into the teacher-training curriculum. In the year 1941, the number of normal schools in India was 612, 376 for men and 236 for women; the number of training colleges was 25. The percentage of trained teachers was 61.3.

Sargent Report (1944)

"Post war educational development in India", the report of Sir John Sargent, recommended that only those students who have the aptitude for teaching should be selected after their high school education. Practice teaching, refresher courses and research facilities should be provided. Regarding duration, the report suggested two years training for pre-primary and junior basic schools, three years for senior basic schools, one year for graduates and two years for non-graduates. He suggested that the professional course should include school visits, discussions and other experiences to develop an interest in education. He recommended higher pay scale to attract better teachers.

After independence, India's education policy has undergone significant change due to social pressures and advancement in science and technology. Consequently teacher education programmes have also changed to meet new challenges.

3.2 NEW DIMENSIONS TO THE ROLE OF TEACHERS

Among the many resources necessary for the development of a nation, the most vital are its human beings. The development of human resources helps both the individual and the nation. Education is an important input in the development of human resources. The effectiveness of the education system rests upon the quality of its teachers and the process of teaching and learning. The effectiveness of a teacher, in turn, depends upon the kind of knowledge, skills and attitudes he/she possesses.

"A sound programme of professional education is essential for the qualitative improvement of teachers. Investment in teacher education can yield very rich dividends because the financial resources required are relatively small when measured against the resulting improvements in the education of millions."[12] This calls for introduction of: (a) quality teacher training programmes, pre-service and in-service, (b) quality of students admitted to teacher training programmes, (c) relevance of teacher curriculum, (d) improved input to professional preparation of teacher educators, and (e) infrastructural support of the teacher education institutions.

The traditional view of the role of a teacher as transmitter of knowledge is no longer valid. The explosion of knowledge and its spread due to the advancement of science and communication system have called for the need of different types of capabilities to be developed in a teacher. The accelerated growth of scientific knowledge and its application is making today's knowledge obsolete by tomorrow and existing methods ineffective. The advent of electronics has revolutionised information and its dissemination. Today's student has access to almost any knowledge. Hence, the role of teacher as a mere transmitter of knowledge needs to be changed to a facilitator in the learning process, helping students to learn by themselves and helping them to acquire required skills, attitudes and values.

The emphasis in education has shifted from teaching to learning, as such teaching needs to be so designed as to bring about changes in the student behaviour. To achieve this, several new areas of teacher competencies are being identified. Among these are:

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[12] NCERT, *Teacher Education — Education and National Development.* Report of the Education Commission, 1994-66, (Published at the publication unit NCERT, New Delhi - 110 016), 124.

- Competency to adopt learner centred, inter disciplinary and problem solving approaches.
- Skills to operate both formal and informal education set up.
- Knowledge and skills to teach new areas of content.
- Ability to teach handicapped children in a regular school set up.
- Capability to identify and nurture diverse talents and thus cater to individual needs.
- Competency to use educational technology and the media in the teaching learning processes.

In short, this calls for a competency-based approach to teacher education.

NCERT's frame work for a teacher education curriculum emphasises on: (a) relevance of the curriculum to the personal and social needs of children in schools, (b) interdisciplinary and integrated approaches in teacher education, (c) task oriented teacher education, (d) rich and varied field experiences in practice teaching/internship inclusive of micro-teaching and other innovative practices, (e) continuous evaluation with the focus changing from assessing to guiding, (f) experiments, innovations and research for development, (g) self-learning, (h) problem-solving, (i) objective based instruction, (j) working with the community and (k) related practical work

3.3 POLICY INITIATIVES IN TEACHER EDUCATION INVOLVING INTERNATIONAL CO-OPERATION

India inherited a teacher-training programme based on the British model. For secondary school teachers, it is a one-year programme, following a Bachelor's degree in an academic discipline. The assumptions seems to be that content knowledge should precede professional preparation, that four years of college education are adequate to assure competence in the subject area and that a one year programme can adequately prepare people for beginning teaching positions in secondary schools.

Despite its preponderance, the model of teacher education has been subjected to severe criticism over the years. The deficiencies highlighted by several committees and commissions include the following:

(a) Isolation from the main stream of university education.

(b) Lack of time to develop professionalism and commitment.

(c) Inadequate attention to subject matter competencies.

(d) Substandard teachers, colleges and programmes.

(e) Lack of scholarship and research competence among teacher educators.

(f) Little demonstration of effective teaching on the part of teacher educators.

(g) Dichotomy of theory and practice.

(h) Lack of inter-university planning.

In the light of these deficiencies, the National Commission (1964-66) suggested a comprehensive programme of improvement in teacher education, under the following heads:

— "Removing the isolation of training institutes by bringing them into the mainstream of the academic life of the universities and by building up closer relations with the schools and between the training institutes preparing teachers for different levels.

— Improving the quality of training programmes and training institutions.

— Expanding training facilities.

— Making adequate provision for the continuing professional education of all teachers.

— Creating appropriate agencies, both at the centre and in the states, for the maintenance of standards in teacher education".[13]

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[13] Ibid., 124, 125.

The recommendations of the major committee/commission towards the reform of teacher education brought out the need to look for alternative models, in other developed countries.

The National Policy of Education is based on the recommendations of the University Education Commission (1948), the Secondary Education Commission (1952-53) and the Education Commission (1964-66). Educationists and experts in various disciplines from the UK, the USA, the USSR, Japan and the Federal Republic of Germany contributed to the framing of the recommendations. Through its economic agreements with the Government of India from time to time the USA contributed indirectly in shaping the educational policy. Funding was provided under PL 480 programme in mid 1960s to strengthen certain aspects of the educational system.

The National Educational Policy has shaped and evolved from the contribution of educationists and technical assistance from various developed countries, international organisations like UNESCO, UNDP and non-governmental organisations such as Ford Foundation and Rockfeller Foundation.

3.4 MAJOR ORGANISATIONS

3.4.1 UNIVERSITY GRANTS COMMISSION (UGC)

The University Education Commission (1948-49) comprehensively reviewed the problem of university education. The report of the Commission is of great significance and has been the basis of all-important reforms in higher education attempted in the post-independence period. One of the major recommendations was that a University Grants Commission (UGC) should be established in India on the lines of UGC in England. Accordingly, the Government of India established the UGC in November 1953 and made it an autonomous body in 1956. The Commission serves as an advisory body to the Central and State Governments in matters of: (a) Opening of new universities, (b) Coordinating/advising/maintaining standards, (c) Allocating and disbursing grants for the development of universities, (d) Collecting information relating to university education in India and other countries as it thinks fit and making the same available to any university.

Teacher Education Panel

A panel of Teacher Education has been set up within the UGC to monitor teacher education. The panel makes recommendations to the Commission on the following matters:

(a) Improvement of standards of teaching and research in University Departments of Education and Colleges of Education.

(b) Identification of the learning needs of the community.

(c) Promotion and support of studies/research pertaining to educational and developmental needs of the community and the country.

(d) Preparation of curriculum and teaching / learning materials in functional literacy.

(e) Organisation of training for various categories of educational personnel and mid-term appraisals.

(f) Work with the elementary and secondary schools in the neighbourhood to improve their standard.

(g) Orientation of teachers in new techniques of education.

(h) Identification and cultivation of talent.

Contributions of the UGC to Teacher Development Programme

The UGC has made valuable contribution to the development of university education. It has carried out enquiries into many aspects of higher education including living conditions of teachers and students. It has provided within the limitations of its funds, grants to universities and colleges to improve and expand libraries and laboratories, build hostels and staff quarters. It has also provided grants for construction of student centres and classrooms.

The Commission has provided financial assistance to improve teacher education and teacher educators. It has supported the universities and colleges in their efforts to arrange seminars, conferences, workshops and summer institutes for college teachers. All these activities have helped the teachers to (a) acquaint themselves with the latest developments in their disciplines, (b) facilitate exchange of ideas with experts, (c) enrich their knowledge of subject matter and (d) familiarise themselves with new research and techniques.

Summer Institutes

During the years 1963-1972 the UGC and the NCERT, in collaboration with USAID and National Science Foundation of USA (NSF) organised Summer Institutes to improve subject matter competence of teachers and teacher educators. Curriculum development and revision and techniques of instruction were also addressed in these institutes. The course was for six to eight weeks during the summer vacation under the supervision of competent teaching staff, using modern textbooks, improved laboratory techniques and teaching aids. By the year 1972, a total of 353 Summer Institutes, covering 13700 teachers, had been conducted. Thereafter, the NCERT took over the activity for five more years. These summer institutes were very popular among college and secondary school teachers and teacher educators.

The UGC has also provided a number of incentives for teacher educators. These include national fellowships, national associateship scheme, teacher fellowships and travel grants for attending international conferences and seminars.

National Fellowships

Twenty National Fellowships are provided by UGC to outstanding professors of University to do research in all the disciplines. They are allowed one/two years of leave, an allowance of Rs.600 per month, and a grant of Rs.20,000/- per annum towards contingent expenditure. During the tenure of the fellowship, they receive their normal salary and allowances. In the field of technical education, 200 fellowships are offered every year for the training of teachers for M.Tech and Ph.D. programmes.

Teacher Fellowships

This programme allows college teachers to work for their M.Phil. or Ph.D. degree. Teachers in affiliated colleges, who are deputed for this scheme, are allowed study leave with full salary, with Rs.750

allowance per month and a contingent grant of Rs.5,000/- per annum. This scheme is designed to enhance the competence of the teachers in content and methodology of teaching. (This scheme was discontinued in 1981).

Travel Grants

The UGC provides travel grants to College and University teachers and Teacher Educators to attend national and international seminars and conferences. The travel grant is limited to 50% of the travel costs, registration and living allowances. The state or the University provides the remaining 50%.

Career Awards

This award is given to young teachers, below 40 years of age, offered for three years, possessing a doctoral/post-doctoral degree. The award amount is upto Rs.1.50 lakh with full salary for a period of 3 years. There are two to three research awards available every year. For women candidates the age is relaxable by 10 years.

National Lectures

This scheme allows outstanding teachers and research scholars to visit other universities/colleges for delivering lectures and participating in academic programmes of those institutions. It allows an honorarium of Rs.1,500/- and a grant of Rs.250/- (this is being revised) in addition to travel allowance.

In addition to teacher development programmes, the UGC makes recommendations to government for improved salaries.

During the Fifth Plan period, the UGC panel of teacher education has made certain recommendations, focusing on: (i) development of education as a discipline, and (ii) the inter-disciplinary approach to the preparation of teachers.

3.4.2 NATIONAL COUNCIL OF EDUCATIONAL RESEARCH AND TRAINING

As a consequence of the agreement signed between the Government of India and USAID on September 8, 1958, technical assistance was to be provided by the Teachers' College, Columbia University, for the development of a national centre for leadership training in professional education so that education could make a more effective contribution to the economic development of India. As a consequence, the National Council of Educational Research and Training, (NCERT) was established on September 1, 1961. Funded by the Government of India, NCERT is an autonomous organisation and acts as an academic adviser to the Ministry of Education and Culture in implementing policies and programmes in the field of school education. It undertakes the following programmes and activities:

(a) Conducts, aids, promotes and co-ordinates research in all branches of school education and teachers' education.

(b) Organises pre-service and in-service training of teachers.

(c) Organises extension services for such institutions and agencies in the country that are engaged in educational reconstruction.

(d) Develops and/or disseminates improved educational techniques, practices and innovations in schools, institutions and agencies.

(e) Collaborates with international organisations such as UNESCO and UNICEF and national level organisations in other countries.

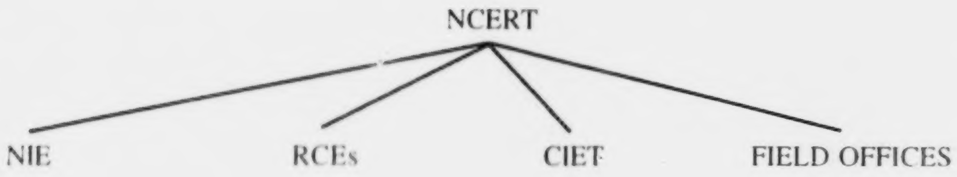
(f) Extends facilities for training and study of educational personnel from other countries.

(g) Serves as the academic secretariat to the National Council for Teacher Education (NCTE) and national development groups for Asia and Pacific Programme of Educational Innovation for Development (APEID, UNESCO, Bangkok).

(h) Assists state level institutions/organisations/agencies in developing and implementing programmes for qualitative improvement of School Education.

NCERT is comprised of the National Institute of Education (NIE), Regional Colleges of Education (RCEs), Central Institute of Educational Technology (CIET), and Field Offices as shown in the following table.

Fig. 3.1



The National Institute of Education (NIE)

NIE was created by the NCERT on September 1, 1961, with the assistance of Dr. Paul Leonard and his team from the Teachers' College, Columbia University. This was patterned on the same model as the NIE in the USA and was financed by the PL 480 fund of USA. The major impact of American education has come through this organisation.

NIE forms an important unit of NCERT. After several re-organisations, the latest being in May 1984, the present set up is as follows:

(a) Department of Education in Social Sciences and Humanities (DESSH).

(b) Department of Field Services and Co-operation (DFSC).

(c) Department of Teacher Education, Special Education and Extension Services (DTESEES).

(d) Department of Pre-School and Elementary Education (DPSEE).

(e) Department of Educational Psychology, Counselling and Guidance (DEPC&G).

(f) Department of Education in Science and Mathematics (DESM).

(g) Department of Measurement, Evaluation, Survey and Data Processing (DMES&DP).

(h) Department of Vocationalisation of Education (DVE).

(i) Department of Policy, Research Planning and Programming (DPRPP).

(j) Publication Department (PD).

(k) Workshop Department (WD).

(l) Department of Library Documentation and Instrumentation (DLDI).

(m) Journals Cell (JC).

(n) International Relations Unit (IRU).

The Department of Teacher Education, a part of DTESEES, has been playing a pivotal role in the promotion and development of teacher education in the country.

The major areas of work undertaken by the Department are as follows:

(a) Development of Teacher Education Curriculum and Transactional Methodologies.

(b) In-service Education and Training and Extension.

(c) Academic support to centrally sponsored scheme of Teacher Education.

(d) Development of data-based information system.

(e) Research in Teacher Education.

(f) Academic support to special education for the disabled.

Achievements of the Department of Teacher Education

During the 1970's, NCERT's Department of Teacher Education and the Centre of Advanced Study in Education of the M.S. University, Baroda, devised a number of programmes to update teachers with new innovations in teacher education. These included the following:

(a) Developing programme of microteaching techniques.

(b) Developing professional skills of training and teaching, using those programmes.

(c) Conducting workshops to dissipate the concept of microteaching.

(d) Conducting research studies in the integration of skills during the process of teaching.

(e) Publishing the reading material for the teacher educators, student teaching and evaluation of student teaching.

(f) Training of teachers in socially useful productive work which form the part of teacher training curriculum.

(g) Training of teachers in training schools.

(h) Developing books on research methodology.

(i) In-service education for teachers.

(j) Developing and publishing reading materials for teacher educators, in the area of student teaching and evaluation of student teaching.

During the 1980's, the important activities taken up by the Department of Teacher Education were as follows:

(a) Development of curriculum in teacher education for elementary and secondary teacher education on the basis of revised NCTE curriculum framework.

(b) Development of handbooks of elementary and secondary education.

(a) Development of textual materials in teaching of science in Elementary Teacher Education Institutions.

(b) Development of In-service Training Design for principals and faculty of elementary school teachers.

(c) Orientation course in Models of Teaching.

(d) Orientation course in Microteaching.

(e) Training of key persons from the States / UTs in the Mass Orientation Programme (PMOST) of NPE 1986. •

(f) Development of training package for the centrally sponsored Operation Blackboard Scheme and training of key persons from states who, in turn, trained resource persons for training primary teachers.

(g) The academic support to the scheme of Integrated Education of Disabled Children (IEDC).

(h) Development of context specific strategies for education of disabled children under the UNICEF assisted projects like Project Integrated Education for the Disabled (PIED).

(i) Production of video films on Models of Teaching.

(j) Development of design for Dictionary of Indian Education and Encyclopedia of Indian Education.

Regional Colleges of Education

Four Regional Colleges of Education were established in the early 1960s to launch a major experiment in teacher education. They introduced the four-year integrated course for the pre-service training of teachers in multipurpose schools. The subject areas covered were agriculture, commerce, science, technology and home science.The four colleges are located at Ajmer, Bhopal, Bhubaneshwar and Mysore, catering to four regions of India .

RCEs take part in developing innovative programmes of in-service education, formulating and implementing research and experimental studies related to curriculum, methodology of instruction, evaluation and educational administration. They also develop instructional materials for the use of teacher educators and teacher trainees.

Under the bilateral cultural exchange programmes, NCERT has collaborated with various countries such as the USSR, Yugoslavia, Czechoslovakia and Rumania by sending its officers for observation cum study tours in the fields of formal teacher education, science and maths education and instructional aids. It has also deputed officers to important international conferences and training programmes.

Over the years, NCERT has played a central role in stimulating professional growth of teachers, teacher educators and other educational personnel.

3.4.3 NATIONAL COUNCIL OF TEACHER EDUCATION

The setting up of the National Council of Teacher Education (NCTE) in 1973 is considered a landmark in the history of Teacher Education in India. NCTE is an apex body responsible for the formulation of policies for teacher education programmes at all levels and for the maintenance of high standards.

NCTE obtained a statutory status under the Government of India, Act No.73 o [illegible] s functions cover programmes of education, research and the training of personnel at pre-primary, primary, secondary and senior secondary levels, non-formal education, part time education, adult education and distance education.

Since 1973, the council has undertaken major initiatives, particularly in the areas of curriculum organisation, teaching methodology and evaluation, and norms for teacher training institutions at primary and secondary levels.

The NCTE has close linkages with various educational agencies both national and international. These include Association of Indian Universities (AIU), Indira Gandhi National Open University (IGNOU), Indian Council of Social Science Research (ICSSR), Commonwealth of Learning, Commonwealth Secretariat, Foreign Universities, UGC, NIEPA, NCERT, UNICEF and UNESCO. NCTE also represents India in APIED programmes.

Some of the important functions of NCTE are follows:

(a) Undertake surveys and studies in the field of teacher education.

(b) Set minimum academic requirements, both for admission to teacher education programme and for amendment to teaching positions.

(c) Stipulate guidelines and standards for teacher education institutions with respect to equipment, facilities, academic and other personnel examination, tuition and other fees and other matters.

(d) Plan and sponsor in-service training programmes for teacher educators at the inter- state level in consultation with the state council.

(e) Take all necessary steps to prevent commercialisation of teacher education.

(f) Perform such other functions as may be entrusted to it by the Central Government.

"Teacher Education Curriculum — A framework" was developed by NCTE and was published in the year 1978. This lead to several changes in teacher preparation programmes in various Universities and boards in the country. An expert group was called in February 1988 to examine the framework again and a draft document "Guidelines and Syllabi of Elementary and Secondary Teacher Education Curriculum" was developed. This document deals with; (a) foundation courses, (b) stage relevant specialization, (c) teaching methodology, (d) additional specialisation and (e) school experience.

Correspondence cum Contact Courses

This was first instituted in the RCEs and some universities in 1977 to help to clear the backlog of untrained teachers. Care was taken not to compromise the quality of training. Launched as transitional project, it was to be phased out after the backlog of untrained teachers was cleared. However, the adoption of this programme by other institutions has resulted in several irregularities and abuses which became a matter of grave concern.

The NCTE is therefore, working for the closure of this system and has recommended that the first pre-service degree in education should be institution based.

Some of NCTE's other activities include, the development of a code of professional ethics for teachers, the development and refinement of tools to measure the accountability and the social and professional responsibilities of teachers. The standardisation of these tools is to be taken as projects by the Department of Teacher Education for M.Phil. and Ph.D. students.

3.4.4 NATIONAL INSTITUTE OF EDUCATIONAL PLANNING AND ADMINISTRATION

The National Institute of Educational Planning and Administration (NIEPA) is an autonomous body set up by the Government of India in 1970 by taking over the Asian Institute of Educational Planning and Administration which was set up in 1962 under an agreement with UNESCO. NIEPA organises pre-service and in-service training courses for educational personnel including teacher education, undertakes, co-ordinates and aids research in various aspects of educational planning and administration, provides a forum for exchange of views between practicing administrators and experts in the field of educational planning and administration and provides facilities for training and research in educational planning and administration to other countries, especially in Asia.

Eight academic units are responsible for the development and execution of NIEPA's training and research programmes. These are: educational policy, educational planning, educational administration, educational finance, school and non-formal education, higher education, sub-national systems and international.

Training

NIEPA's training programmes cover various cadres of educational planners and address both micro and macro issues. Participants get exposure to modern techniques of educational management, which can bring about attitudinal changes necessary for greater efficiency and effectiveness in planning and administration. A comprehensive exercise is undertaken to assess the training needs of such government agencies as SCERTs, SIEs, and DIETs as a basis for evolving an annual training calendar.

NIEPA conducts 50 to 60 training programmes annually. It conducts diploma programmes in educational planning and administration for district level functionaries and a similar programme for educational administrators from the developing countries. So far 250 officers from various States/UTs in India have attended the national diploma programme and 160 foreign nationals from 40 countries have participated in the international diploma programme.

Research

NIEPA promotes and assists both theoretical and action research, apart from conducting surveys, analytical studies and research projects having policy implications for different sectors of education. The research findings are published and disseminated through its in-house journals and international journals. NIEPA's publication unit brings out a quarterly journal "Journal of Educational Planning & Administration" for the dissemination of innovations and research. NIEPA's "Action

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Research on Implementation Strategies for Education (ARISE)", which was undertaken to promote enrollment and retention of children in school, serves as a laboratomry in micro-level planning and management.

3.5 MAJOR PROGRAMMES IN TEACHER EDUCATION INVOLVING INTERNATIONAL CO-OPERATION

3.5.1 REGIONAL COLLEGES OF EDUCATION

Evolution of Multipurpose School

At the time of Independence, secondary education in India was a "Single track" System, catering only to academic preparation of students, making them fit for college education and almost unfit for anything else. A matriculate could get into a college more easily than he could get into a productive vocation in life. It was recognized by the Government of India that school education had to be diversified to accommodate the needs of a large majority of students who wished to enter the world of work after completion of secondary education.

The Secondary Education Commission constituted in 1952 reviewed the field of Secondary Education and recommended;

(1) The re-organization of the structural pattern of secondary education.

(2) Diversification of the secondary curriculum.

(3) Reform in the examination system.

With regard to (1), the Commission recommended eight years of integrated basic education followed by three years of higher secondary education with a marked diversification of subjects. This eleven years course was designed to enrich the curriculum and make the course terminal for those who did not want to further their studies in the university. The higher secondary courses included three languages, social studies, general science and a selected craft as compulsory subjects and a choice of three elective subjects from the humanities and the sciences.

With regard to (2), the Commission recommended multipurpose schools as a corrective to the existing single-track system of secondary education. In addition to the core curriculum, provision was suggested for a diversified set of electives, namely humanities, science, technology, commerce, agriculture, fine arts and home science.

During the first five-year plan, 77 high schools were converted into higher secondary schools and 374 into multipurpose schools. During the second plan, this number rose to 3121 and 2115 respectively. It was found that out of 2115 multipurpose schools, only a small fraction offered more than three of the seven diversified electives recommended. Hence, although the idea of multipurpose schools was well conceived and the expansion took place rapidly, their objectives could not be fully realized.

A study was undertaken by the Ministry of Education in 1958 and subsequently by the Ohio State University Team (OSU) in India that revealed, that the success of the multipurpose school pattern was dependent on the following factors:

(a) A clear understanding of the purpose and function of multipurpose schools.

(b) The supply of qualified and trained teachers especially in practical courses and provision for pre-service training.

(c) Provision for instructional materials like hand books and text books.

(d) Increase in the range of elective courses.

(e) Provision of facilities in educational and vocational guidance.

(f) Training and supply of teachers for industrial craft.

(g) Provision of qualified and trained teachers to teach general science courses.

The emphasis during the third five-year plan, therefore, was on consolidation and improvement of existing multipurpose schools rather than on expansion. An attempt was made to correct the deficiencies by establishing four regional colleges of education offering integrated teacher training programmes to prepare teachers for the multipurpose schools.

The Regional College Project

The purpose of the regional colleges was to serve as an effective instrument for NCERT by providing leadership to secondary education in general and the multipurpose school programme in particular. This project was assisted by the USAID through a contract with the College of Education, Ohio State University, Columbus (Ohio) which was already assisting in the improvement of the Secondary Education Programme.

The specific objectives of the project were:

(a) To develop and provide training programme for teachers in science, crafts, agriculture, commerce, home science and fine arts needed for multipurpose schools.

(b) To provide in-service programmes and field services to the staff of multipurpose schools in the region.

(c) To provide in-service programmes and field services to secondary schools in general as a regional centre.

(d) To organize and develop a model Demonstration Multipurpose School.

(e) To try out improved methods of teaching in relation to multipurpose schools as well as in general secondary schools.

(f) To take up pilot studies and research projects in teacher education.

(g) To prepare and disseminate instructional materials for the secondary schools and multipurpose schools and collaborate with schools in initiating and promoting improved methods of teaching.

(h) To function as a clearing house in this regard and generally to provide leadership.

Four Regional Colleges were established one in each of the northern, eastern, western and southern regions of India, Ajmer, Bhubaneshwar, Bhopal, Mysore.

Location	*Region Served*	*States & Territories Covered*
Ajmere	Northern	Jammu & Kashmir, Punjab, Rajasthan,Uttar Pradesh, Delhi and Himachal Pradesh
Bhubaneshwar	Eastern	Assam, Bihar, Orissa, Manipur, West Bengal, Tripura, NEFA and NHTA
Bhopal	Western	Maharashtra, Madhya Pradesh and Gujarath
Mysore	Southern	Andra Pradesh, Mysore, Madras and Kerala

Approximately, a hundred acres of land was provided for each college complex which included the college building, demonstration multipurpose school, hostels, staff quarters, and some ancillary buildings. The college building housed administrative block, library, seminar and lecture rooms, student common rooms, staff rooms apart from departments of science, agriculture, commerce, and technology.

The college programme included:

1. Four-year programme for preparing teachers of science.
2. Four-year programme for preparing teachers of technology.
3. One-year teacher education programme in: (a) Agriculture, (b) Commerce, (c) Science, and (d) Technology.
4. A programme of in-service education.
5. Three types of programme for craft teachers: a one-year diploma programme, a two- year diploma programme and a two-year degree programme.

The successive teams of experts under the Ohio State University Contract have helped in planning: 34 Foreign Consultants were in India to assist the Regional Colleges programme. 52 Regional College faculty members of NCERT were trained at Ohio State University for periods varying from three months to seven months between the years 1962 and 1969. American equipment and books totalling to a value of $ 275,000 were donated and installed at the regional colleges. Consultant assistance was provided in the areas of agriculture, commerce, professional education, science and technology. Consultants were involved in wide range activities in providing assistance such as:

(a) Preparing plans for programmes and facilities.
(b) Improving instruction through supervision and demonstration.
(c) Preparing written curricular materials.
(d) Conducting in-service training programmes.
(e) Promoting regional college programmes with the help of State officials and professional educators.
(f) Assisting in developing selected studies and experimental pilot projects.

Indian faculty members participated in the American Education systems. One type of participation involved a combination of university course work, specially designed seminars and visits to selected schools, other institutions and agencies. This type of exposure gave the participants a first hand experience as a student in an American university. The other feature was the orientation to student teaching programmes in American teacher education system and this programme was of six to seven months' duration.

The second type of participant training programme covered a period of three to four months for participants in a leadership position. The schedules of these participants were to be flexible to assist them to travel to different locations to meet with prominent American educationists, to observe experimental programmes and to develop broad understanding of the American education system.

Outstanding Features of the Programme

The most striking features of the Regional College programme are as follows:

(a) Inter Disciplinary Approach: The content of the four-year teacher education programme included subject matter, professional education, general education and supervised field experience, which are integrated in the four year sequence. The weightage to these three areas is approximately 60% subject matter, 20% professional education and 20% general education, leading to two university degrees.

(b) Internship in Teaching: The students are sent for 8 weeks of continuous participation in selected outstanding secondary schools. After a period of observation and interaction with school people, students are given responsibility for teaching regular class. Regional College staff and Heads of the Co-operating Schools work with pupil teachers. Apart from practising teaching, pupil teachers spend considerable time in observing classes, learn as much as possible about school organization, working of library, use of laboratory, utilization of community resources and other school activities.

(c) Team Teaching: The method of team teaching permits the maximum use of varied talents and abilities of each staff member and provides opportunity for students and staff to work closely on varied aspects of the theory of education, its practice and application in the classroom during internship in teaching.

***(d) Internal Assessment*:** Student performance is assessed internally and on a continuous basis, which helps the student to achieve his maximum potential, and helps to develop desirable attitudes, understanding, skills and knowledge.

***(e) Demonstration Multipurpose School*:** The demonstration multipurpose school serves as a laboratory to test theories and try out techniques of teaching. The regional college personnel and the school counterparts work in close co-operation to develop worthwhile projects and the trainees witness theory rendered into practice.

(f) Work Experience: Many of the competencies related to attitudes, skills and personal traits can be developed only through organized programme of learning experiences and through group work. Work experience is, therefore, an integral part of the total educational programme of RCEs and is developed carefully so that it enriches the total learning of all students.

(g) Enriched Content: Both in the four year integrated programme and in the one-year programme, the content of the subject of specialization is enriched. The experts in the fields of agriculture, commerce, home science, fine arts, technology and education ensure that the knowledge of subject matter is in tune with the latest and significant developments in their disciplines. A team approach in teaching by experts in content and pedagogy makes teacher education dynamic and purposeful. Another area in which the team approach can make great contribution is in preparing instructional materials and conducting research.

(h) Summer School Cum Correspondence Courses (SSCC) for B.Ed. Degree: The summer schools conducted in RCEs provided an opportunity to train untrained teachers during summer vacations, when library and laboratory and other facilities can be profitably put to use. The summer schools included two consecutive summer residential programmes of two months each with the intervening period of ten months being used for practice teaching in the candidate's school. Outstanding teachers from various parts of India were responsible for organising, supervising and assessing the work done by the candidates in their own schools.

(i) Summer Institutes: The Regional College of Education also helped in conducting summer institutes in science, psychology, mathematics, agriculture and English assigned by the University Grants Commission from 1964. RCEs are ideally suited to conduct such programmes, due to the availability of infrastructure facility and other educational resources.

(j) Maximum Utilization of Resources: The activities of Regional Colleges of Education are varied. Not only do they enrich the programme of secondary teacher education but they also have the responsibility to offer in-service education and field services, undertake research projects, do innovations in teacher education and disseminate instructional materials. Classrooms, libraries, laboratories and reading rooms are put into maximum use by providing longer working hours and flexibility in timetable. The residential nature of the institutions and availability of large space and equipment facilitated the activities.

Decline of Multipurpose School Movement

The multipurpose school scheme called for diversification of studies at the end of Class VIII and the provision of a variety of courses for students in Class IX to XI. A number of schools started offering several streams of electives in Class IX, X & XI. Students were divided according to streams of their electives and opportunities for their further study depended upon their selection of groups.

The multipurpose schools, somehow, did not overcome the basic defects of higher secondary pattern. Most of the students who joined the schools had only one primary purpose, that is, to pursue their studies further at a university. Therefore only a few students enrolled in streams like fine arts, agriculture and technical stream, which did not lead to popular courses at University stage. Science courses, which led them to further studies at universities, were in great demand. Since the national economy did not allow starting a number of courses, which were in low demand, most of the multipurpose schools did not have more than three diversified groups. Hence the main objectives to provide a variety of courses to cater to the different interest groups, attitudes, talent, etc., had not been realised.

The other weakness of the multipurpose school scheme was that the specialization began too early in their life, when they are just 13 or 14 years old, whereas the world trend was to lengthen the period of general education and postpone diversification and specialization to the senior secondary education. So the National Commission (1964-66) recommended that in the non-vocational schools, common curricula of general education should be provided. This would enable the best preparation for students to cope up with the rapid changes that were bound to take place due to rapid advancement of science and its application.

Thus the multipurpose school movement slowly came to an end. RCEs' main objective to produce teachers for the diversified courses in vocational subjects lost its bearing. The feasibility of providing integrated courses in general and professional education in particular in RCEs came in for a lot of criticism. It was felt that:

(a) A young student of 16-17 years old, who has just completed secondary education, could not be in a position to decide to take up teaching as his profession.

(b) Moreover, there was no evidence to prove integrated approach was superior to traditional approach in the training of teachers.

(c) It was costly to provide best educationists and professional teachers at RCE to teach the integrated courses. It would be more economical for the university, having strong departments of education, besides having good departments in basic sciences, agriculture, and technology, to conduct such courses and also research in integrated courses in education.

(d) The total number of teachers trained at RCEs formed only 5 to 10% of the total number of trained teachers required at the secondary stage and did not help in raising the standard as a whole.

Analytical Study of the Project[14]

The one year degree programme which was started to produce teachers in the diversified courses in agriculture, commerce, home science, science and technology were operational for two years. By then, the multipurpose school movement began to decline, which hit the entire project. This problem continued to the point where the multipurpose concept no longer served as the central theme for the Regional College project.

The Government of India's project review noted that Regional Colleges of Education should focus their activities upon the elementary and secondary levels of education. This led later to another review that vocational education should be transferred to other agencies that are directly in charge of vocational education. So the project objectives related to multipurpose school movement lost their bearing.

The Regional Colleges had trained teachers, provided in-service education courses, provided useful instructional materials and conducted numerous studies and investigations and had increased their associations with the broader field of secondary education. But the Government of India Review of 1968 recommended greater attention to the elementary education sector.

To quote the Ohio State University Research Foundation on the Regional College of Education programme: "The challenges are difficult to perceive, and the problems are many. Issue-laden decisions are made one way today and another way tomorrow because of lack of unanimity on many questions. The entire situation in Indian education then is one where some worthy basic goals have been established but their achievement is hampered by the traditions of the past. The situation is so vast that rapid changes are impossible and small changes are lost in the vastness, especially to the casual observers ... The Regional Colleges must function in the environment of uncertainty and diversity".

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[14] Based on the Research Report *India's Regional Colleges of Education: A Critical Appraisal*, US Department of Health, Education Welfare, 1971.

The project of Regional College of Education had a dual objective. One was to supply better-trained teachers in the vocational areas for the multipurpose schools and, to some extent, for secondary schools in general. The other was to sponsor several new and improved patterns and practices in teacher education of different duration and content, some leading to a degree and others to a diploma, which would lead to changes in the programmes of the other teaching training institutions. The four-year integrated course in the fields of science and technology was introduced in the beginning. A four-year programme in Commerce and English followed this. This pattern was to unify content and professional education and also to make early commitment of students to the teaching profession.

The success of the Regional Colleges in terms of enrolment was quite significant. It started with 281 students in the year 1963-1964 in all the four regions and rose to 2875 by 1968-69. The Summer School Cum Correspondence Courses (SSCC) became very popular among practising teachers interested in furthering professional preparation [See Table III(i)].

One can also infer a wide range of programmes in diploma and degree courses were offered in the early years but they were discontinued for want of enrolments. The attitude of staff encouraged more of degree programme developments and less towards new kinds of activities. The Regional Colleges attracted more students from the State in which it is located as it was inconvenient for the students to get enrolled in institutions far away from their home when it is easy for them to get enrolled in the teaching institutions of their own State. The introduction of stipends did help in getting one-half of the students from one-fourth of India.

Table III (i): Programmes offered and number of students enrolled in RCEs during 1964-1969

Year	*AJMER*						*BHOPAL*				
	64	**65**	**66**	**67**	**68**	**69**	**65**	**66**	**67**	**68**	**69**
I Yr. Agriculture	14	13	25	23	27	31		13	11	29	26
I Yr. Commerce		21	17	25	28	32	14	15	14	24	18
I Yr.Science	53	45	37	40	41	63	10	15	20	38	40
I Yr. H.S.		17	8	8	9						
4 Yrs. Agriculture											
4 Yrs. Commerce										25	46
4 Yrs. Science		51	78	121	179	215	48	73	71	80	104
4 Yrs. Technology	68	114	142	152	138	62		.26	41	46	
SSCC				172	153	270			115	188	415
2 Yrs. Diploma Craft				18	33	5	13	19			
3 Yrs. Diploma Craft		24	42	26	8						
2 Yrs. Craft		14	29	16							
2 Yrs. Fine Arts									5	15	
4 Yrs [illegible] B.Ed.									32	52	41
I Yr. Fine Arts								10	8	1	
M. Ed.										9	16
IInd Craft											

Year	*BHUBANESHWAR*						*MYSORE*					
	64	**65**	**66**	**67**	**68**	**69**	**64**	**65**	**66**	**67**	**68**	**69**
I Yr. Agriculture		6	3	9	9	6	10	8	11	9		
I Yr. Commerce		21	14	11	15	10	23	31	29	24	14	8
I Yr. Science	31	70	51	67	73	102	43	114	65	51	60	67
I Yr. H.S.									15	20	15	
4 Yrs. Agriculture												

(Table III(i) Cont.)

(Table III(i) Cont.)

Year	*BHUBANESHWAR*						*MYSORE*					
	64	**65**	**66**	**67**	**68**	**69**	**64**	**65**	**66**	**67**	**68**	**69**
4 Yrs. Commerce										42	83	120
4 Yrs. Science	18	91	98	148	188	211			57	103	162	213
4 Yrs.Technology	25	50	73	98	107				54	71	78	65
SSCC				157	140	259				45	150	219
2Yrs. Diploma Craft												
3Yrs. Diploma Craft		18	27	43	38	18						
2 Yrs. Craft												
2 Yrs. Fine Arts												
4 Yrs.BA.B.Ed(Eng)				36	66	101				28	65	88
1 Yr. Fine Arts												
M. Ed.						10						
IInd Craft								31				

(Based on the research report: India's Regional Colleges of Education: A Critical Appraisal, US Department of Health, Education & Welfare).

It was too early to evaluate the benefits of preparing new teachers at the Regional Colleges and also the turnout from the colleges was very small in the beginning. The one-year B.Ed programme represented less of variation from the traditional Indian pattern.

Testimonials were received from school administrators and educational leaders about the competence and professional dedication of teachers trained in RCEs, but their placement in schools was very discouraging, as the training in these colleges was oriented towards multipurpose schools. The problem of Centre-State relationship created additional difficulty in the placement of the Centre-trained teachers in the State sponsored institutions.

Evaluation Study by the Ohio State University

The Ohio State University which was associated with the RCEs between 1964-1969 undertook a critical study of the project in 1970, to assess the effectiveness of RCEs in terms of their stated objectives, to measure the influence of RCEs on the secondary teacher education programme in all the four regions, to compare the programme of RCEs with other teacher education programmes in India which were not in receipt of U.S. assistance, to find out the problems that confront the teacher training programmes in RCEs at that time and to make recommendations to increase the efficiency of its teacher training programmes.

The important findings of the research were as follows:

(1) The RCEs provide well-balanced liberal, professional and specialized education.

(2) RCEs have smaller classes, better instructional facilities and "custom tailored" training programme when compared to other teacher training programmes.

(3) The RCE demonstration schools are excellent laboratory schools.

(4) The internal assessment in RCEs is very successful.

(5) The students and faculty enjoy lot of freedom on the campus and students receive individual instruction from their faculty.

(6) The RCE curriculum is more practice oriented and life oriented.

(7) The RCE staff who are trained in foreign institutions seems to do more creative work than their counterparts who are trained in India.

(8) RCEs do promote better integration of States through: (i) interstate recruitment of students and teachers, (ii) regional and national language instruction, (iii) English as a medium of instruction, (iv) interstate seminars and conferences.

(9) RCEs are very actively conducting in-service programmes in various subjects throughout the country.

(10) The summer cum correspondence courses in RCEs are becoming more and more popular among schoolteachers.

(11) The faculty of RCEs enjoys a better salary than the teachers in the training institutions.

(12) The RCE students have better scholastic achievement at the high school level than other teacher trainees of institutions.

(13) The RCEs and their programmes are not popular among Indian people.

(14) The RCE graduates find it difficult to get jobs due to prejudicial outlook of employees.

(15) The guidance and counselling services available on RCEs are far from satisfactory.

(16) Many of the RCE graduates do not intend to take up work in high school immediately. They want to work for their M.Ed. and Ph.D. degrees to prepare themselves to teach colleges.

(17) The RCEs have failed to fulfil their research commitment so far, by their programme of activities.

(18) There is a strong feeling among teachers that a two-year training programme should replace 4 years and one-year teacher training programmes.

(19) The RCE students, faculty and administration are so committed to the teaching profession that practically no one wants to turn away from it even if they are given a second chance for it.

(20) The Indian Secondary schools impart medium and traditional education. The curriculum is very traditional and rigid.

(21) The teacher training institutions have no systematic evaluation of their faculty and programme.

(22) The teacher training institutions do not provide quality education to the student teachers.

(23) The practice teaching is not effective in the training colleges.

(24) The training colleges do not have any programme for character development of their students.

(25) The training colleges have a large number of untrained teachers on their faculty.

(26) The teaching load is very heavy in both schools and colleges and they find very little time to do any research work.

The following are the major recommendations contained in the report:

(1) Proper recognition should be given to talented teachers through gifts, grants and other awards of great esteem.

(2) There should be a faculty evaluation committee to advise and assist the administration on matters such as promotion, retention and tenure.

(3) A complete overhauling of the training college and secondary school curriculum be undertaken and both staff and students be drawn into the curriculum redevelopment effort.

(4) A curriculum committee be set up at the local level instead of the state or university level to frame the curriculum and to evaluate and revise it periodically.

(5) There should be a major shift in staff utilization to strengthen classroom instruction at all levels.

(6) The secondary school teachers should be ranked and merit pay should be established.

(7) Staff development centres be organized which would place responsibility for continuous selection, professional preparation and gradual induction of teachers jointly in training colleges, universities and local schools.

(8) An aptitude test or inventory be developed, as soon as possible, for the selection and recruitment of teachers.

(9) NCERT be reorganized into three major divisions: (i) Planning & Research, (ii) Personal Services, and (iii) Administrative Services.

(10) The four-year programme be continued for a minimum of five years on an experimental basis and at the end of the five-year period a systematic product evaluation be conducted. Based on these findings, a decision be made concerning the future of these innovative programmes.

(11) Automatic stipends for all the RCE students be stopped; instead, those students who prove to be in the upper 5% of the class be given scholarships and others be given tuition-free education. However, failures would be charged with tuition and other fees, should they decide to come back for their training in RCE's.

(12) The Division of Planning and Research in NCERT should survey the teacher needs of the country for the next five or ten years and candidates be carefully recruited and trained in various subjects, not exceeding the projected number for each year.

(13) The technology and agriculture programme of RCE's be discontinued immediately. The craft programme be upgraded into a degree programme, training personnel in Arts, Crafts and Cottage Industries. The commerce programme be continued for a few more years to measure its full impact.

(14) RCEs should concentrate more on in-service training programmes in all subjects, with the programmes held regularly throughout the school year.

(15) The training of a specific number of graduates each year through RCE's be dropped.

(16) The four-year undergraduate programme in Arts and Sciences be continued and the graduate programme be delayed. However, if the undergraduate programme is transferred to other colleges, RCE's should concentrate on graduate programmes alone.

(17) RCEs should take measures to design, develop and publicise inexpensive teaching aids, curriculum materials and other instructional devices.

(18) The Research Division of the NCERT should develop strategies and techniques for evaluation and experimentation, aimed directly towards the improvement of teacher training programs in India.

(19) RCEs should have guidance workers to assist the students in planning their programmes, while in college, and pupil personnel services especially relevant to the Indian population.

(20) NCERT should set up a special committee to explore the ways and means to bring about a healthy relationship between RCEs and other teacher-training institutions in the country, in order that the former may function more effectively as regional clearing houses.

(21) RCEs should develop a more effective and far-reaching public relations programme and teacher placement service than the existing facilities.

(22) The Participant Training Program in the U.S. under the AID plan be discontinued and the funds be utilized to provide special training to all the RCE faculty members under the direct supervision and control of NCERT or NIE in India.

(23) The summer-cum-correspondence course be intensified in order that more and more of the untrained teachers may be able to complete their training on a part-time basis

The report suggested the following Main Recommendations for Future Regional Colleges:

As the apex body, NCERT has two major areas of responsibility in respect to elementary and secondary education:

(a) Research and development regarding possible new directions in education.

(b) Dissemination of materials, ideas and processes — especially for teacher education and administration.

The report make the following observations:

Innovation requires experimentation and it needs people who are oriented towards change. There is a need for recruiting people who have got experience in implementing new ideas or at least are favourably inclined. Professional orientation and continued in-service education activities for staff members of the Regional Colleges are essential.

When the multipurpose school movement lost its momentum, the Regional Colleges were flexible to act on the other related, broader objective. When emphasis on pre-service programmes was lost, immediately the in-service programme activities took a major role. The Centre has the responsibility of developing and demonstrating innovations but its widespread implementation is the responsibility of the States. The majority of the in-service activities should be aimed at teacher educators and administrators, rather than teachers, to achieve more of an impact from widely scattered regional centres.

Developments in RCE's during 1970-80

During the decade 1970-1980, one can infer there were lot of changes in the programme of RCE's.

The M.Ed. degree course was started in different colleges at different times. M.Sc.Ed. course in Physics, Chemistry and Mathematics was started in RCE at Mysore and M.Sc.Ed. course in Life Science at RCE, Bhubaneshwar. The objective of starting these courses was to prepare competent teachers to teach higher secondary schools with intensive specialization in contents and integration of content and methodology. One year B.Ed. (Elementary) course was introduced in all the colleges to prepare teacher educators/supervisors for elementary schools and one year M.Ed. (Ele.) course was introduced in Bhubaneshwar in 1979-80.

During 1976-77, the committee constituted for the re-organization of the program of RCE recommended the closing of the four year integrated course in a phased manner in all colleges except Mysore, reducing the intake of students for one year B.Ed. course and four year B.A., B.Ed. course and starting new courses like Contact Cum Correspondence Course (CCCC) both for elementary and secondary teachers. However, during 1977-78, the revival of the four year integrated course was recommended along with a one year B.Ed. course in all languages and vocational subjects for the + 2 stage in agriculture, commerce and technology.

Apart from running the above courses, RCEs are involved in:

(a) developing instructional materials for the use of teacher educators and teacher trainees.

(b) conducting training and extension activities for the qualitative improvement of school education and teacher education

(c) researching into problems of education and teacher education

(d) implementing innovative programmes of pre-service and in-service education

(e) collaborating with the State Government to improve teacher education programmes.

TABLE III (ii): Courses offered in the four RCE's from 1981 onwards

	AJMER	*BHOPAL*	*BHUBANESHWAR*	*MYSORE*
1	4 Yrs. B.Sc., B.Ed.	4 Yrs. B.Sc. B.Ed.	4 Yrs.B.Sc.B.Ed.	4 Yrs.B.Sc.B.Ed.
2		4 Yrs.B.A. B. Ed. in English	4 Yrs. B.A. B. Ed. in English	4 Yrs.B.A. B. Ed. in English
3	1 Yr. B.Ed. specialisation in Science/Agriculture/ Commerce/English/ Hindi/Urdu	1 Yr. B.Ed. specialisation in Science/Commerce/ Ele. Education	1 Yr. B. Ed. (Sec) in Arts/Science 1 Yr. B. Ed. (Ele.) in Arts/Science	1 Yr. B.Ed.
4	1 Yr. M.Ed. in Science/Commerce/ Urdu	1 Yr. M.Ed. in Science Education/ Teacher Education/ Counseling/ Ele. Education	1 Yr. M.Ed.	1 Yr. M.Ed.
5			2 Yrs. M.Sc. (Life Science /Ed)	2 Yrs. M.Sc. Ed. in Physics, Chemistry & Maths.
6	B.Ed. (SSCC)	B.Ed. (SSCC)	B.Ed. (SSCC)	
7			Multi category training and teaching (UNICEF assisted project)	

The colleges conduct vorkshops, seminars, orientation programmes, conferences, and develop innovative practices with the help of Demonstration Multipurpose Schools. The colleges also conduct in-service training programmes in areas of teacher education, educational administration, secondary and elementary education.

The summer school cum correspondence course started in 1966 in RCEs turned out to be a laudable and effective scheme for clearing the backlog of untrained teachers. This course is a connecting link

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between professional education and contact cum methodology courses. This programme continued in all RCES till 1988. The backlog of teachers to be trained was cleared by then.

The RCEs have also offered field services, extension services and in-service training facilities for teachers and other personnel, largely based on the needs of the regions and their resources and competencies. RCEs work in close cooperation with field officers in identifying programmes needed in states and offer suitable services. The colleges also take up the preparation, publication and dissemination of instructional materials in different subjects, for the benefit of schools in the region.

Transformation of RCEs into Regional Institutes of Education

NCERT has made heavy investment in developing the RCEs over the years in terms of buildings, equipments, subject-wise laboratories, libraries, demonstration schools, staff quarters and hostels. A large number of competent teachers in different subjects have been added. RCE's have assumed the role of pace setting institutions in setting high standards in pre-service and in-service teacher education.

Though RCEs took a browbeating in their original programme, they have all the potential to take up the leadership in the field of teacher education. There was a lot of confusion among educators about the actual role of Regional Colleges. At that point of time in 1982, the Government of India set up a Task Force under the leadership of Dr. Madhuri Shah, the then Chairman of UGC, to review the objective and structure of NCERT. The Committee also examined the objectives, methods of implementation of those objectives and structure of regional colleges. The Task Force recommended, among other things,that Regional Colleges of Education be developed into Regional Centres of NCERT. It also identified ten functions to be undertaken by them. While accepting the recommendations of the Committee, the Government of India set up a working committee under Dr. Das in 1986 to recommend steps for the implementation of the recommendations.

The following are some of the major recommendations:[15]

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[15] Based on the publication by the National Council of Education Research and Training New Delhi 1987

(1) Four-year integrated courses of teacher education in Science and Arts with intake of 60 students in each course may be continued at each Regional Institute.

(2) One Year B.Ed. course in its present form be discontinued at each Institute. In its place, a one year B.Ed. course ,designed to prepare teachers both for secondary and higher secondary levels be offered to only Master's degree holders.

(3) One year B.Ed. (Ele.) course be discontinued and 3 to 4 months in-service training course in elementary education be offered to elementary teacher educators and supervisors.

(4) B.Ed. (SSCC) course be stopped, as there is no backlog of untrained secondary teachers.

(5) The M.Ed course may be continued after restructuring it with intensive specializations in Special Education, Educational Technology and Primary Teacher Education, with total intake of 30 in each Institute.

(6) The M.Sc.Ed. course may be continued to be offered until the M.Sc.Ed. course on campus-cum-distant learning pattern to trained graduate teachers of science in-service is stabilized.

(7) Suitable in-service course of 6 to 8 weeks duration be offered to teachers in Work Experiences/SUPW and in Vocational Education in the areas of Technology, Agriculture and Commerce. Alternatively the 3-year Diploma course in Industrial Crafts after X class which was offered at one time may be revised with suitable modifications for the above purpose.

(8) A course of 4 to 6 months duration leading to a certificate in special education with due emphasis on integrated education of handicapped (of one category) be offered to trained graduates.

(9) A certificate course of 4 to 6 months duration in Educational Technology be offered to trained graduates with emphasis on script writing for radio and TV educational programmes including software development for other technologies.

(10 In-service education of teachers in pre-school education may be taken up in collaboration with State Government, with the Regional Institute training teacher educators and resource persons and other profession learners.

(11) A certificate course of 3 to 4 months duration in elementary education be offered to trained graduate teachers to enable them to develop competencies required of elementary teacher educators/supervisors. Alternatively, such a course may be organized on a campus-cum-distant learning pattern.

(12) Advanced level in-service programmes in special subjects be offered during summer vacation to secondary teacher educators for their professional growth in collaboration with University/UGC.

(13) Orientation/training to teachers/teacher-educators in the identification and development of talent may be organized.

(14) In-service training for secondary school teachers in the new core curriculum be organized in consultation with State Governments to train resource persons who, in their turn, will train the teachers.

(15) The Regional Institution (a) should undertake the development and dissemination of a variety of relevant and useful instructional materials and other media resources relating to different subjects, to school education and teacher education. (b) should design and produce a variety of useful teaching aids and learning kits for children and (c) should undertake development of a variety of software in educational technology, such as slide film-strips, films, audio and video programmes and computer programmes.

(16) There should be collaborative planning and effective sharing of work between the NIE and the Regional Institute of Education for implementing national policies and programmes. National level nodal centers in respect of some specified programmes and projects may be located at the Regional Institute.

(17) A post of Joint Director for Regional Institutes and Field Services be created and filled to guide, supervise and coordinate the work of the Regional Institutes and the Field Offices and a Deputy Secretary and supporting staff should assist him.

(18) The Regional Colleges be renamed as REGIONAL INSTITUTES OF EDUCATION instead of Regional Centres as the institutions will be conducting various pre-service and in-service teacher education courses leading to degree/diploma of a University.

(19) The designation of the Head of the Regional Institute may continue to be "Principal", but his status and powers may be raised to that of a Joint Director.

(20) The Regional Institute should obtain the status of autonomous college in the University to which it is affiliated. This will enable it to design and run innovated courses leading to degrees/diplomas and certificates of the University. An academic Committee/Council with subject-wise boards of studies may be formed as per rules of the University to plan and develop the courses.

(21) As per the recommendations of the Task Force, 25 per cent of available vacancies may be filled on deputation basis from personnel of State Governments for a period not exceeding 3 years at a time and some additional academic staff particularly in Social Sciences, Technology, Agriculture and Commerce will be needed in each Institute to perform the new roles and functions.

(22) The provision of two Junior Fellowships already available may be continued to promote academic research of high level leading to Ph.D.

(23) The demonstration multipurpose school will continue to run academic courses from Class I to XII and in addition

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Note: During the year 1995, Regional Colleges of Education have been transformed to Regional Institutes of Education with shift in the emphasis of their programme as per the recommendations of Dr. Das committee.

vocational courses at +2 stage, as approved by the Central Board of Secondary Education. The school will work in close collaboration with the Regional Institute. The Institute faculty will not only guide but also participate in school programmes for innovation and experimentation. The teachers of the school will be involved in in-service programmes, etc., of the Regional Institute.

(24) Each Regional Institute shall develop its own Institutional plan with the help of an internal committee, consulting or associating a few experts from outside.

(25) The courses should, as far as possible, reflect integration between subject of specialization and professional education.

(26) In all courses leading to degree/diploma, tuition fee should be charged as prevalent in similar courses of the University. Scholarships may be given to the top 50% of the students enrolled, in order of merit; maintenance stipend may be given only for the period of campus course when it is carried with distance/field learning for teachers in-service.

(27) Each member of the academic staff should work 6-1/2 hours a day (40 hours a week, which will be suitably distributed over teaching, institutional projects including development and extension) academic and professional and personal research.

(28) Regional Institutes should establish effective formal and informal linkages with State agencies of education. Directors of SCERTs/SIEs should be members of their Programme Advisory Committee. Also State Governments be requested to include Principals of Regional Institutes as members of the Programme Advisory Committee of SCERTs/SIEs.

Impact of RCE Programme on Teacher Education

The experiment of the NCERT, which introduced the four year integrated course in teacher education to remove the inadequacies of one-year teacher education, has helped in preparing professional teachers well qualified in both content and pedagogy.

The four semester M.Sc.Ed. course is the first innovative experiment of its kind to have proved successful and has been accepted by the Universities of Southern region as equivalent to M.Sc. Other universities are examining the possibility of introducing relevant science education courses based on M.Sc.Ed.

The curricula developed for teacher education for B.Sc.Ed and M.Sc.Ed. lend themselves to horizontal and vertical mobility of teachers in their profession. The curriculum, is a response to the changing needs of the teaching profession, its philosophy of education and organizational changes. The 8 semester B.Sc.Ed. and 4 semester M.Sc.Ed. courses cater to research workers in Science/Maths education, teacher educators and college level teachers.

The correspondence cum contact courses which were introduced in 1977 to update teacher's knowledge of content and methodology was a most appropriate in-service programme for teachers. Besides, the correspondence lessons proved to be valuable resource materials for the teachers in the absence of latest books in the school library.

The RCEs have gained experience in organising workshops, seminars, orientation courses, refresher courses, summer school cum contact courses leading to B.Ed. degree for the untrained teachers and many other in-service programmes as well as research work.

RCEs have produced quality work in instructional resources and exemplary materials in many of the subjects. The teachers trained in RCE colleges were superior to other teachers in both content and methodology as per the testimonials given by many school administrators and educationists. As per the placement records of students, the products of RCEs stand out both as teachers and research workers.

3.5.2 TRAINING OF (PRIMARY) TEACHER EDUCATORS

During the decade 1950-1960, there was a great pressure to expand the educational opportunities at the primary level of education in the Asian region, due to a variety of social, economic and political factors. The average annual rate of enrolment, which was 4.8% during 1950-55, rose to 5.9% during 1955-60. This provided a basis for the adoption of the Karachi Plan, which was convened by UNESCO by the representatives of Asian region during December 1959 - January 1960. The plan set to establish at least seven years of free and compulsory education for all Asian children by 1980. The pressure of expansion at primary level shifted to secondary level by 1960-65. The Karachi Plan recognised the training and supply of teachers as a critical factor in realising the target of the plan.

In 1956-57, the number of teacher training institutions for primary teachers in India was 916 and the percentage of trained teachers was 62. By 1970, the number of training institutions rose to 1228. The number of Teachers Training Colleges were 303, and the number of University departments to trian reachers were 32. This expansion was seen in almost all countries of the Asian Region, and brought to surface the problem of staffing the institutions with qualified and competent personnel.

The Regional Conference of National Commissions for UNESCO held in Manila in January 1960 put proposals for the establishment of an Asian Institute for Teacher Educators, with a special reference to education of primary school teachers. Accordingly, the Asian Institute of Teacher Educators (AITE) was established in 1962 at the University of Philippines in Manila. The UNESCO conference also recommended the training of high level teaching personnel in sufficient numbers in each country, through the establishment of special institutions at the national level. The primary functions of the regional institute were:

(a) To train teacher educators for the country of the region.

(b) To keep in touch with the selected training institutes of the region, partly to improve its own programme of teacher education in keeping abreast of the problems that arise in the area of teacher education.

(c) To train persons in research in the area of teacher education, curriculum, textbooks and teaching methods in primary schools.

The Asian Institute of Teacher Educators

(a) Offered a nine months course for teacher educators deputed by Asian Government which later is converted into two shorter courses in a year of four months each.

(b) Gives consulting services to the national level institutes of the region in teacher training.

(c) Facilitates national level teacher training institutes to disseminate their new ideas and practices in teacher education.

(d) Conducts comparative studies in the curriculum and methods of teacher education, including such aspects of student teaching, demonstration and evaluative procedures in the teacher training institutions in the region and disseminates the report of those studies among the countries in the region.

(e) Provides training in research.

The curriculum for the nine months consisted of:

(A) Professional education, and

(B) General Education.

"Professional Education component was comprised of the following courses:

(a) Organisation, administration and supervision of primary teacher training institutions.

(b) Curriculum of primary teacher training institutions.

(c) Principles and methodology of teacher training.

(d) Professional laboratory and library experiences.

(e) Research methodology with special reference to problems involved in teacher education and teachers. .

General Education component was comprised of the following:

(a) Teacher Education for promoting international understanding.

(b) Education and Socio-economic development.

(c) Talks by experts in various fields such as literature, art, science, anthropology, archaeology, etc.

(d) A weekly assembly.

(e) Optional individual study in a cultural area of special interest of the trainee."[16]

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[16] E.A. Pires, *Some Experiments in Teacher Education in Asia* — Editorial Forum, Vol. XXII, No. 2, May 1981.

In addition, the trainees received a set of study assignments, which included participation in meaningful discussions originating from their experience. Tutorials, field studies, special interest groups, professional laboratory and library experience were also included.

AITE organises sub-regional seminars in selected countries to make it possible for a large number of associate institutions to keep abreast of the most recent educational concepts and techniques. It also organises training courses. AITE's important contribution is its encouragement to the Asian regional states, to set up their own courses for teacher educators, which some of the countries did.

In India, NCERT is contributing, through its Department of Teacher Education, to the professional development of teachers by:

(i) Providing advanced level training courses in teacher education.
(ii) Conducting research in various aspects of teacher education.
(iii) Preparing instructional methods for the use of training institutions.
(iv) Providing consultative services to the states.
(v) Acting as a clearing house of ideas and information.
(vi) Organizing seminars, workshops, for the benefit of teacher educators at the elementary level.

Since 1976, the Regional Colleges of Education have started a B.Ed. (Elementary) course. The RCE at Bhopal has started M.Ed. (Elementary) course of one-year duration since 1979-80.

Such special courses to train teacher educators for staffing elementary level are desperately needed. At present, the elementary teacher educators in India are B.Ed or equivalent degree holders from a training college and have no special training to teach in primary training schools.

3.5.3 MICROTEACHING

Introduction

The Education Commission, 1964, observed, "at present, student teachers are commonly required to give a specified number of isolated lessons, many of which are often unsupervised or ill-supervised. The practice of continuous block teaching, the duration of which varies from two to six weeks, is adapted only to a few situations and its organisation skill leaves much to be desired".

The need for an alternative method of teacher preparation programme with an empirical basis was recognised. Research had shown that the traditional method of teacher training programme was far from satisfactory because:

(a) Supervision of practice was haphazard.

(b) Feedback was global and not specific.

(c) The number of lessons given and the total time spent on preparation lacked uniformity.

(d) The attitude of teacher trainees towards practice teaching was not favourable.

Attention was therefore drawn to microteaching as an innovative technique for developing teacher competence.

The underlying principle of microteaching is that the complex teaching act can be analysed into simple teaching skills. Microteaching requires the student teacher to teach a single concept using specified teaching skill, to a small group of people, in a short duration of time. The technique enables a beginner to practice teaching skills and gain confidence in a simulated situation, not following the real situation in which the normal complexities of the classroom are absent. Turney et. al. define Microteaching as a teaching in miniature where it is scaled down in terms of class, size, time and task. The focus is on a specific teaching skill. In practice, microteaching consists of short teaching periods, with a small class and a small unit, a follow up critique and a reteach session with a similar class using an improved course which has been planned after critique session.

History of Evolution of Microteaching

The National Council for the Accreditation of Teacher Education (NCATE) of the USA in 1960 found that teaching practice was "entangled in a mass of confusion, unmade decisions and experiments...without a comprehensive definition and clearcut statement of goals and purposes". Innovations such as Interaction Analysis, Protocol Material, Role-Playing, Modular Approach to Training and Simulation emerged in answer to the criticism of traditional methods of teaching. Microteaching arrived at the same time.

Microteaching was conceived at Stanford University in 1963 as a part of an experimental research project aided by Ford Foundation and Kettering Foundation, to (a) Identify specific teaching behaviours, which are observable and (b) Develop and test evaluation instruments to measure the attainment of the skills.

Allen and his associates at Stanford University developed a demonstration lesson for the trainees to teach "role-playing students" in order to provide a situation traumatic enough and to develop a desire in them to learn instructional techniques. This proved successful and the trainees modified it by using realistic approach of teaching a self-planned lesson of their specialised field to all students. The lesson was followed by a critique session during which they received feedback from the supervisor and students. By introducing the model lesson in the beginning and reteach session after the feedback at the end of the lesson, they set the foundation for the microteaching lesson.

It was found that teachers prepared through microteaching performed better than those prepared through traditional method, even though the time involved with microteaching programme was less than 10 hours a week, compared to 25 hours a week required in the traditional preparation. By the year 1969, microteaching technique was used in 141 colleges and universities of USA. Soon, the technique was adopted in Ireland and Scotland and disseminated to Germany, England, Canada, Iraq, Maldives, Malaysia, the Philippines, Australia and India. At the Far West Laboratory for Education Research and Development, San Francisco, microteaching was extended to mini courses which were researched and adapted by the University of Lancaster, UK, through the help of Overseas Educational Development (OED).

Development of Microteaching in India

In India, Tiwari initiated microteaching in the Government Central Pedagogical Institute in Allahabad, in 1967. In 1969-70, Allen, who coined the word, "Microteaching" visited India. Her lecture inspired teacher educators to accept microteaching in teacher training programmes to overcome the drawbacks of traditional training.

Research efforts were also initiated in Technical Teachers Training Colleges at Madras, Calcutta and Chandigarh in the early 70s. Masters level and doctoral level research was carried out in the Centre of Advanced Study in Education (CASE) at Baroda from the year 1970. The findings showed that teaching competence of student teachers was greatly enhanced by microteaching. In 1975, the technique was introduced in the secondary teacher-training programme in CASE. In order to disseminate the concept of microteaching to other teacher training institutes and to promote research, several workshops were conducted by CASE in collaboration with NCERT. This prompted teacher-training institutions at Pune, Ratnagiri, Abohar, Bombay and Surat to introduce microteaching either on an experimental basis or as a full-fledged programme.

In 1975, the British Council collaborated with Sterling University, Scotland, and sent a number of experts from Ulster, Scotland, to conduct workshops in microteaching in Maharashtra and Tamil Nadu. These states successfully carried out follow-up of work of these workshops for the next five years.

During 1975-82, four long range national research projects were taken up by NCERT in collaboration with CASE and Department of Education, Indore University. These helped in disseminating microteaching in the secondary teacher training colleges throughout India. In 1975-76, the Department of Teacher Education of NCERT conducted a study of effectiveness of microteaching versus traditional programme for developing teaching competence. The study supported earlier findings. During 1977 and 78, another national project, "Differential Effectiveness of Microteaching Components" and its replication in the consecutive year also confirmed the effectiveness of the microteaching technique.

These positive results gave an empirical basis to institutionalise microteaching in the curriculum of secondary teacher training programmes in India. Since 1973, a large number of orientation programmes for teacher educators have been organised by the Department of Teacher Education, NCERT, for adaptation and diffusion of microteaching at secondary teacher education level. Also, the department has produced instructional materials in microteaching.

The National Council of Teacher Education (NCTE) prepared a document "Teacher Education Curriculum- A Frame Work" in the year 1978, to be used as a guide in the reconstruction of teacher education. This focuses on the core teaching skills in training programmes. One of the objectives expected to be achieved through pre-practice preparation, using techniques like microteaching and simulation, is the acquisition of efficiency in the use of core teaching skills.

Results of studies on various aspects of microteaching and integration of skills taken up by the Regional College of Education and other university departments were so encouraging that the NCERT decided to extend microteaching to the elementary level teacher training. The regional orientation courses for elementary teacher educators were started at NCERT during 1980-82.

Adaptation to Indian Conditions

The microteaching abroad used gadgets like Video Tape Recorder (VTR) and Close Circuit Television (CCTV) in modelling the behaviour of a student teacher in the use of particular skills and for providing feedback of his teaching performance. This proved to be costly in Indian conditions and was therefore modified. The experimental try out was carried out by CASE at Baroda with low cost technology. or no cost technology. Instead of using gadgets, modelling is done through written materials, lectures, demonstrations and discussions. And the feedback is given by actual systematic observation. This technique of microteaching, successfully modified and adapted to Indian conditions, came to be known as Indian Model of Microteaching.

The Indian Model of Microteaching has the following features:

(a) The mode of presenting the theory (modelling) is done through lectures, discussions, demonstrations or through written materials instead of gadgets like audiotape, VCR and films.

(b) Live observers give feedback to student teachers. These observers can be teacher educators, supervisors or peer group.

(c) In a college setting, student teachers teach in a simulated condition, using peer group as their pupils instead of real pupils of the school.

(d) The microteaching laboratory can effectively function even with minimum of facilities like space, material and equipment.

(e) The duration of microteaching cycle is:

Teach — 6 minutes
Feedback — 6 minutes
Replan — 12 minutes
Reteach — 6 minutes
Refeedback — 6 minutes
Total — 36 minutes

This is called one full cycle.

Teaching Skills

Microteaching is based on the premise that a complex teaching act can be analysed into simple teaching skills (component teaching skills). Several sets of component skills are identified by different institutions and individuals both in India and abroad. They all can be classified mostly under 20 teaching skills: (1) Writing instructional objectives, (2) Organising the content, (3) Creating set for introducing the lesson, (4) Introducing the lesson, (5) Structuring class room questions, (6) Question delivery and distribution, (7) Response management, (8) Explaining, (9) Illustrating with examples, (10) Using teaching aids, (11) Stimulus variation, (12) Reinforcement, (13) Pacing of the lesson, (14) Promoting pupil participation, (15) Use of blackboard, 16) Achieving closure of the lesson, (17) Giving assignments, (18) Evaluating the pupils' progress, (19) Diagnosing pupil learning difficulties and taking remedial measures and (20) Management of the class.

Since all the training skills cannot be practiced in the limited time available for student training in the training programme, the basic skills like: questioning, explaining, illustrating with examples, reinforcement, stimulus variations, probing questions, management of class are given priority. Other skills can be added, depending upon the availability of time. All these are general teaching skills useful to teachers of different subjects.

Impact of Microteaching on Teacher Education

Microteaching entered the field of education in the year 1971 and, within a span of 10 years, most of the University Departments of Education and Colleges of Education in the country had adopted it. It was adopted in primary education during 1983-84 by the same strategy of research and diffusion as was done in the case of secondary schools. By the year 1986, 32 primary teacher-training institutions had adopted microteaching.

It was a need-based relevant concept to the Indian situation of the teacher education programme and so it became a comparatively relevant innovation. The advent of microteaching has influenced development of a large number of paper-pencil observation schedules to measure the components of skill produced in a trainee in a microteaching setting. It has also influenced in developing tools to measure general teaching competence such as Baroda General Teaching Competency Scale, Training Assessment Battery and Product-Process Appraising Scale of Teacher Effectiveness, which are useful in measuring integration of teaching skills. Appropriate tools such as Indore Teaching Assessment Scale, scale for integration of skills of teaching to assess relevancy, flexibility, sequence, fluency and effective use of various teaching skills have been developed.

Microteaching is one of those innovations, which is a vertically, horizontally and deeply researched programme. Horizontally, it has covered all levels of teacher training, primary, secondary and college, vertically it has covered primary level teacher training institutions, B.Ed, M.Ed, M.Phil and Ph.D levels and deeply it has covered all aspects of microteaching that render it valuable as a training technique and as a research tool.

Between 1973 and 1975, 22 researches were done at doctor level and 18 were conducted by NCERT. At the primary level, 22 primary institutions participated in the national project to test the relative effectiveness of variations in microteaching components. Early studies were aimed at determining the effectiveness of microteaching. Subsequent studies were focused on improvement in components of various teaching skills, effects of different types of feedback, sources of feedback and development of multi media packages for training in teaching skills. The findings of these researchers are as follows:

(a) The planned integration of skills is helpful in improving teaching competence.

(b) Among self, peer and supervisory feedback, peer feedback is most effective in improving competence.

(c) Microteaching retains its effect over the time.

Still, there is a lot of area in microteaching, which can be explored by research as per the 4th survey of research in education.

3.5.4 MODELS OF TEACHING

Introduction

Models of Teaching is an educational innovation in teaching. There are many kinds of learning and students learn in different styles. A teacher equipped with different models or techniques, catering to different types of learning, helps to produce a productive and effective learner. No one particular model can produce all types of learning.

Models of Teaching provide the teacher and curriculum maker with range of approaches to create interactive environment for learning. Bruce Joyce and Marsha Weil in USA conducted a long search for useful models of teaching and found them in plenty. In the year 1980, they changed the existing theories and theoretical knowledge into different "Models of Teaching" which teachers in classrooms can readily use. These theories have been invented by professionals who included counsellors and therapists like Erikson, Maslow and Rogers, learning theorists Ausubel, Bruner and Skinner, philosophers like Broudy, Dewey and James, development psychologists like Hunt Kohlberg and Piaget and many classroom practitioners.

Definition of Models of Teaching

Models of teaching are teaching strategies, which can be used to realise different instructional goals. Prof. Bruce Joyce defines that a model of teaching is a plan or pattern that can be used to shape curriculum, to design instructional materials and to guide instruction in the classroom and other settings.

From the enormous list of Models, Bruce Joyce and Marsha Weil selected 25 of them, useful in educational settings and accomplishing most of learning. They have classified them according to their purpose and grouped them into four families: Information Processing Models, Social Interaction Models, Personal Models and Behaviour Modification Models.

Fig. 3.2
FAMILY OF MODELS[17]

Information Processing Models	Social Interaction Models	Personal Models	Behaviour Modification Models
1. Inductive Thinking Inquiry	1. Group investigation	1. Non-directive teaching	1. Programmed instruction
2. Scientific inquiry	2. Social inquiry	2. Awareness training	2. Managing behaviour
3. Concept attainment	3. Laboratory method	3. Synectics	3. Relaxation
4. Cognitive growth	4. Jurisprudential	4. Conceptual systems	4. Anxiety reduction
5. Advance organiser	5. Role playing	5. Classroom meeting (Social problem solving)	5. Assertive training
6. Memory	6. Social		6. Simulation
			7. Direct training

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[17] BruceJoyce, Marsha Well, *Models of Teaching*, Indian Edition, Prentice Hall of India Pvt. Ltd. New Delhi 110001.

Information Processing Models: This Model refers to the ways the people handle the stimuli from the environment, organise data, sense problems, generate concepts and solutions to the problems and employ verbal and non-verbal symbols. The goals of Information Processing Model are the development of pupils' intellectual skills and the acquisition of knowledge by them. Some Information Processing Models are concerned with the ability of learners to solve problems and thus emphasise productive thinking. A large number emphasises concepts and information derived from the academic disciplines.

Social Interaction Model: The Models from this family emphasise the relationship of individuals with other individuals. They focus on social issues being resolved through academic inquiry and logical reasoning. They also stress on the development of skills to improve the individual's ability to relate to others, to engage in democratic processes and to work productively in society.

Personal Models: These Models emphasise the processes by which the individuals develop the capacity, personal development in terms of creativity, self-concepts and self-understanding and creative problem solving. They also focus on the emotional life of the individual.

Behavioural Models: The emphasis in these models is changing the visible behaviour of the learner rather than the underlying psychological structure and the unobservable behaviour. Behaviour Models have wide variety of applicability in education, military training, intra-personal behaviour and therapy. Some models are media-oriented and others are oriented to inter-active teaching.

All the four categories of the Models are not mutually exclusive in their characteristics and goals. Even within the families they share many features common in their goals and the means they recommend. The Information Processing models are also concerned with social relationships and the development of an integrated functioning self. The Social Interaction Models are also concerned with development of mind and self and the learning of academic subjects.

Instructional and Nurturant Effects of Models

The direct effect, which is produced in a learner by the Model, is called instructional effect. The indirect effect, which is obtained by experiencing the environment created by the Model, is called nurturant effect.

The Models have one or more instructional and nurturant effects. Selection of a Model is done on the basis of the desired instructional and nurturant effects.

As examples three Models from Information Processing Models, and one from each of the other families of Models, Personal Model, Social Interaction Model and Behaviour Model with their instructional effects and nurturing effects are given below:

Fig. 3.3 : Instructional Effects and Nurturing Effects of some Models

Sr. No.	*Model*	*Instructional Effects*	*Nurturing Effects*
1	Inquiry Training Model (Information Processing Model)	(a) Scientific process skills (b) Strategies for creative inquiry	(a) Spirit of creativity (b) Independence or autonomy in learning (c) Tolerance of ambiguity (d) Tentative nature of knowledge
2	Advance Organiser Model (Information Processing Model)	(a) Conceptual structures (b) Meaningful assimilation of information and ideas	(a) Interest in inquiry (b) Habits of precise thinking
3	Concept Attainment Model (Information Processing Model)	(a) Nature of concepts (b) Improved concept- building strategies (c) Specific concepts (d) Inductive reasoning	(a) Awareness of alternative perspectives (b) Tolerance of ambiguity (but appreciation of logic) (c) Sensitivity to logical reasoning in communication
4	Synectics (Personal Models)	(a) General creative capacity (b) Creative capacity in subject domain	(a) Achievement in subject domain (b) Group cohesion and productivity
5	Jurisprudential (Social Interaction Model)	(a) Framework for analysing social issues (b) Ability to assume role of the "other" (c) Competence in social dialogue	(a) Empathy/pluralism (b) Facts about social problems (c) Capacity for social involvement and desire for social action
6	Assertive Training (Behavioural Model)	(a) Integrative interpersonal relations (b) Skill in dealing with conflict	(a) Reduced stress and anxiety in social situations (b) Positive feelings about self/personal growth (c) Reduction in psychosomatic symptoms

Basic Procedures for Implementing Any Model

Joyce and Weil (1980) designed basic procedures for the implementation of any instructional Model.

The four concepts used by them in designing the basic procedures are Syntax, Social System, Principles of Reaction and Support System.

Syntax: Syntax describes the Model as a flow of actions. It is described in terms of sequences of events, which are called Phases. Each Model has a distinct flow of Phases. If a teacher use a Model as the basis for his strategy, what kind of activities does he use, in a sequence?

Social System: The social system provides a description of the roles of teachers and students and the kinds of norms that are encouraged. A teacher can assume the role of a taskmaster or a facilitator of group activity or counsellor. In some Models, students and teacher may share equal distribution of activity, whereas in some other Models, students may be at the centre.

Support System: Support System is the additional requirement necessary to implement a Model beyond human skills, capacities and technical facilities, which are necessary to implement the Model, such as library, laboratory, etc.

Principles of Reaction: Principles of Reaction guide the teacher's response to the learner. This tells the teacher how to regard the learner and respond to what he or she does. It provides the teacher with rules of thumb by which to "tune in" to the student and select appropriate response to what the student does.

According to Bruce Joyce and Marsha Weil the training strategy of any Model has the following components: (1) Describing and understanding the Model, (2) Viewing the Model, (3) Planning and peer teaching and (4) Adapting the Model.

It has been found by research that:

(1) Teachers having one style can master any of the Models.

(2) Everyone does not learn every Model equally well.

(3) All teachers are capable of mastering the fundamentals.

(4) Time needed to learn new Models of teaching shortens with new acquisition.

(5) Five to six trials are needed to be able to handle a Model comfortably.

Salient Features of Models of Teaching

(a) All 25 Models are research based.

(b) Varieties of Models are available to achieve different behaviours.

(c) Experience of persons in various fields is available from the Models.

(d) Interactive educational provides the teacher and curriculum maker with a range of approaches to create interactive environment of learning.

(e) A variety of Models enables teachers to enjoy choices.

(f) Different Models can be used for different subjects.

Models of teaching give guidance in the teaching-learning processes and a mastering of a few appropriate Models helps a teacher to accept those Models to suit their teaching situation or to combine them with other Models.

Introduction of Models of Teaching into the Indian Scene[18]

There is a great void between the theoretical knowledge and actual teaching practices in the schools of India and elsewhere, although a great deal of work had been done on human learning in the areas of educational psychology, social psychology, psychiatry, anthropology and many other disciplines.

The common method used in India for teaching was the Herbartian Model of Teaching, with a holistic approach.

Bruce Joyce and Marsha Weil (1980) did pioneering work in transferring the prevailing theories and theoretical knowledge into various "Models of Teaching" which the teachers can use in school settings.

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[18] Based on B.K.Passi, L.C.Singh, D.R. Sansanwal: *Models of Teaching: Report of the three phase study of CAM and ITM ncert 1991.*

During the decade 1970-1980, to improve teaching competencies, at all levels of practice teaching, there was a scientific and systematic effort made in India for adaptation and diffusion of microteaching

During 1980, the area of research concentrated mainly on the integration of teaching skills and its selection, its organisation and sequence in the classroom teaching to form an effective pattern to realise the specific instructional objective. But the integration of the skills always led to the Herbartian Model with a holistic approach and did not contribute much to the purpose of teaching methods in schools.

The Models of Teaching propounded by Ansubel, Suchman, Bruner and others and adaptation of those Models in teacher education by Bruce Joyce and Marsha Weil seemed to be the solution of our problem. This led to the need to incorporate a component of training for the variety of Models of teaching. So, the innovation was first introduced at teacher educators' level to disseminate it at the college level and the teacher trainees' level and into school level. For it was needed (a) to understand the pedagogical understanding of the available Models (b) a careful study of skills needed for the use of those Models in teaching and (c) right selection of Models from the available Models, which would be applicable, functional and workable in the Indian teacher education setup.

Development of Models of Teaching in India

The first orientation programme on Models of Teaching at the Indian scene was conducted at Devi Ahilya Vishwa Vidyalaya, Indore, MP, at the instance of SCERT in the year 1982. This gave an opportunity to create awareness and acceptance among Indian educators about Models of Teaching.

The second programme in the field came as a follow up workshop to develop competence in the selected Models of Teaching, for the participants of the first orientation programme in the year 1983.

The University Grants Commission also had arranged a ten-days' workshop at National level to orient teacher educators in the Models of Teaching. This enabled the emergence of a core group of trained teacher educators from Indore, Kurukshetra, Kolhapur, Delhi, Varanasi and a few more places.

During 1984, the Department of Teacher Education at NCERT took up a research project on Models of Teaching. During the same year, Prof.Joyce from USA came to India under USEFI Scheme and conducted several lectures all over the country and organised several orientation programmes with the help of the Department of Teacher Education, NCERT, for about a year.

Prof. Joyce and Prof. Passi trained a dozen teacher educators as resource persons in Haryana and Pune. These in turn, arranged Regional, State and College level extension lectures and orientation programmes all over the country in Allahabad, Bhopal, Baroda, Hyderabad, Meerut, Mysore, New Delhi, Mangalore, etc. During the year 1985-86, they conducted the National Project taken up by the Department of Teacher Education, NCERT.

Many of the Universities at Simla, Meerut, Indore, Bhopal and Kolhapur introduced Models of Teaching as a part of their syllabus at B.Ed., M.Ed., and M.Phil. levels. This led to the development of instruction materials by teacher trainees and teacher educators, such as teacher analysis course, planning guide, lesson plans and worksheets.

During the Mass Orientation Programme, which was conducted as a part of the in-service programme to orient teachers with the new curriculum of NEP 1986, the teachers were introduced to Models of Teaching. A module of Inquiry Training Model was developed by a team of researchers by synthesising the findings of various research studies and was included in the learning package.

The National Project[19]

In order to develop an effective strategy in the training of and dissipation to all training colleges in India, the Department of Teacher Education, NCERT, with the collaboration of DAVV undertook a major Training-cum-Research Project in the year 1985.

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[19] Ibid.

The objectives of the project were:

(i) To provide training to teacher educators in different Models of Teaching.

(ii) To test the efficacy of training strategy adopted for training in Models of Teaching.

(iii) To study to what extent Models of Teaching can be incorporated as an integral part of teacher training programmes in India.

(iv) To see the feasibility of the application of Models in the Indian classroom.

The National Project was executed in three phases —

Phase I	Developing Training Strategy at Workshop level.
Phase II	Implementing Training Strategy at College level.
Phase III	Adapting Training Strategy at School level.

Since our system of education is oriented to acquiring information, it was felt that Models of Information Processing would be more suitable to improve the Information Processing capability. Two models belonging to the Information Processing family were chosen. They were Bruners Concept Attainment Model and Suchman's Inquiry Training Model. The rationale to choose these two Models were:

(a) They were easy to handle..

(b) They possessed wide applicability across many subjects.

(c) They were inductive in nature.

(d) They could develop critical theory and basic skills of inquiry in the student.

The First National Project on Models of Teaching was planned, designed and enacted during 1985-86.

The first workshop was conducted at DAVV for 8 days from March 31 to April 8, 1985. The workshop trained the teacher educators in two Models and developed training strategy and training design with the help of teacher educators. 55 teacher educators from

30 secondary teacher-training institutions from 11 States took part in the workshop.

The college-based study was conducted by 16 institutions separately. Out of these, 13 of them conducted the study related Concept Attainment Model (CAM) and the remaining 3 institutions in Inquiry Training Model (ITM). 393 student teachers from 16 collaborating secondary teacher institutions took part.

Out of 13 institutions, which conducted the study in CAM, 10 institutions conducted the study at school level. The study related to ITM was carried out by three institutions, which extended it to school stage also. More than 2500 students belonging to different schools from various States in the country participated in the project.

The training strategy comprised the following activities in the Phases I and II.

(a) The theory of the Models of CAM and ITM.

(b) Testing the understanding of the theory.

(c) Demonstration of the Model and observation as per the Teacher Analysis Guide.

(d) Explanation of Lesson Plan and Worksheet.

(e) Peer practice feedback in quadros.

In Phase III, the coaching was conducted by the student trainees in the real classroom setting in schools and employed peer pair practice feedback. The following were the observations made:

(1) Training in CAM and ITM in the form of lecture, demonstration discussion and peer practice feedback did enhance the understanding and competence of teacher educators and student teachers in using the Models of Teaching.

(2) Training in CAM and ITM brought about significant favourable changes in the attitude of both teacher educators and student teachers towards the Models. School pupils taught through Models also expressed favourable reactions.

(3) As a result of training and conducting the experiment in the college, both teacher educators and student teachers developed willingness to implement models of teaching in teacher education programmes, if adequate support system is available.

In addition to the above, the National Project conducted in three phases had also brought out the following positive effects as a by-product:

(1) The three sequential phases brought a large number of institutions from all the four regions of India to take part in the Project.

(2) The Project created more confidence in the researchers.

(3) It trained more persons to participate as a research team.

(4) It could tackle difficult problems as a team.

(5) It created inter-institutional linkages, which helps in executing field-based studies.

(6) The significant observation of the study was that the ITM changed the typical authoritarian teacher dominated classroom into one characterised by high pupil initiatives, the CAM had the effect of transforming the usual passive learning sessions.

Impact of Models of Teaching

Unlike Microteaching, which became institutionalised within a decade of its introduction in teacher education in India, the Models of Teaching which entered the Indian scene in the year 1980 did not catch on so fast.

In order to train the teachers in various Models, there was a need of training strategy to be employed. One training approach advocated in India was peer practice in quadros used in the holistic approach after exposing the participants to theory-cum-demonstration, which was taken up as a National Project in CAM and ITM. It was felt that the approach did not help the trainees to handle the models confidently. Even the teachers found it difficult to handle some important phases of the models. Thus there was a strong need for skill based approach for mastering the various models. The skill based approach in the Inquiry Training Model was developed in India, the credit of which goes to Indian educationist Dr. C. G. D'Lima and her research student Dr. Sugandhi R. Prabhu. This has led to the skill-based approach of other Models: Concept Attainment Model, Stress Reduction Model and Jurisprudential Model.

Different Models require different sets of skills in teaching. The Models can be practiced in micro setting, for which the expertise already exists in India and the student teachers are trained in microteaching methods. All that is needed in training a teacher to handle a particular Model is to identify the various skills and their components in the Model and practise with them, handling the various phases of the Model in micro situations. For example, for mastering Inquiry Training Model through microteaching, the various skills needed are —

(1) Designing the discrepant event.
(2) Presenting the discrepant event.
(3) Guiding pupils to account for discrepancy.
(4) Explaining the rules of the inquiry process.
(5) Guiding and handling verification questions.
(6) Guiding and handling experimentation questions.
(7) Guiding interaction among students.
(8) Guiding theory building.
(9) Guiding the review of the steps of the inquiry process
(10) Guiding the analysis of the thinking process, etc."[20]

The training can be given in all the skills in practising the Model. The time required in giving training in each of the above skills could be reduced by "team work approach" on the part of staff. After being exposed to theory-cum-demonstration, the trainees can practice the ITM in a holistic way. The teacher educator can help the students in practising those skills in which the student needs more practice.

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[20] D'Lima and Sugandhi, *Inquiry Training Model — A skill based approach*. Disney Enterprise, 3/204, Navajivan Co-op. Hsg. Ltd., Lamington Road, Bombay - 400 008, 1986, 12, 13.

"At present the impact of Models of Teaching is seen only on the inner circle of teacher educators and in research. The area of Models of Teaching is still in its infancy. The number of studies conducted at the teacher training level and at school level, so far, are empirical in nature".[21]

3.6 ACTIVITIES OF APEID IN TEACHER EDUCATION

The new development since 1970s is the regional programme Asian and the Pacific Programme of Educational Innovation for Development (APEID), supported by UNESCO and UNDP in assisting the members of the Asian and Pacific countries by building up their national capabilities to design and develop educational innovations through exchange of experience and mutual co-operation, in the field of teacher education.

Teacher education has been a major area of work plan in all the three cycles of APEID from 1974 to 1987.[22]

In the first cycle, activities in Teacher Education Programme concentrated on the promotion of innovations, with a view to orienting teacher education programmes towards national development goals and promoting basic functional education needed to achieve these goals. Preparing teachers for rural development was a major emphasis.

The second cycle focused its activity on strengthening and building national activities, through alternate structures of teacher education, for meeting the demands of teachers as educational personnel from emerging national need and the expansion of educational systems. This necessitated the developing of training materials to support the new structures, methods and curriculum contents and to ensure continuing personal growth of the teacher education.

The third cycle activities were focused on professional support services and training of educational personnel at all levels, development of distance education and systems for both school education and teacher training, production of training manuals and materials towards that end, identifying competencies and skills needed to be developed for various educational personnel and promotion of innovations through a developing network of institutions for the in-service training of teachers, educational personnel and teacher educators and trainees. In 1985,a small joint working group representing APEID prepared a survey questionnaire on Teacher Education. It was sent to member states.

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[21] S.P. Malhotra, *Research in Models of Teaching*, 365.

[22] APEID: *Teacher Education — Issues, Needs and Plans for Action* UNESCO PROFAP, Bangkok 1987.

The APEID's fourth cycle (1987-1991) was concerned with the following activities:

- Inculcation of a value system appropriate to a career in teaching by increasing the entry requirement of the candidates, to teach a trainee which includes attitudinal personality factors and merit.
- Introduction of specific new skills and knowledge by integrating theory and practice in the development of curriculum and increasing the use of alternative means of training as used in resource, curriculum development, research and educational technology centres, and linking of these centres and support service to teacher training institutes.
- Retraining of teachers through in-service education by developing policy guidelines to link promotion and procedures with periodic in-service teacher training, multi-media training packages involving television, radio, and correspondence courses.

Other trends and developments include production of high quality teaching service by introducing task oriented curriculum, overall training and education of teachers, dissemination of information about content, upgrading the status of teaching as an occupation in terms of social standing, improving remuneration and conditions of service to attract talented people and consulting with professional teacher organisations to achieve improvements and developments.

(*Source:* APEID Publications, n. d.)

Developing New Teacher Competencies in Response to Mega Trends in Curricula

The past two decades have undergone substantial social, political and technological changes in Asia and the Pacific region. Many countries in the region are in the process of revising their school curricula and accommodating new changes needed for their school population. If these changes have to be successfully implemented in schools, it is very essential that the teacher education curriculum should reflect those changes in developing content, methodology and material. The curriculum should identify new competencies required by the teachers in schools, develop appropriate strategies and prepare sample materials, and these should form the part of the pre-service and in-service programme of teachers.

The APEID has identified ten mega trends, which have substantial implications for the development of new teacher competencies, in its Tenth Regional Consultation Meeting on APEID. These mega trends in curricular reform have implications for the content of the school curriculum both at primary and secondary school levels.

The mega trends are as follows:

1. Education for all

The curriculum reforms should cater to heterogeneous groups with regard to interest and capabilities.

2. Relevance of the curriculum to the individual and society

The curriculum reform should recognise the fact that the needs of individual and society may not always coincide and it should cater to accommodate both. It also involves selection of issues and trends of local, regional and universal concern, which affect both the individual and the society.

3. Development of appropriate values and attitudes

Desired values and attitudes of a particular society may differ from those of multi-cultural society. The curriculum reform should seek to teach learners how to deal with such conflicting situations.

4. Development of process skills

The curriculum reforms should encourage the learners how to think for themselves and how to develop an ability to move from convergent to divergent thinking.

5. Concern with meeting the needs of the whole individual

Curriculum reform should recognise the holistic nature of the learner and the fact that learner development is not standardised in terms of its nature or in terms of the rate at which it occurs between different individuals.

6. Maximising the full potential of each child irrespective of socio-economic status

The curriculum reform should identify and accommodate the particular needs and interests of disadvantage groups in the society such as women learners and learners from low income backgrounds and curriculum reform should try to achieve equality of opportunity in schooling for, those groups of learners.

7. Learner centred learning and teaching

The curriculum reform should achieve learner centred or child centred approach in both teaching and assessment methods adopted in schools. The teaching and assessment methods should suit the particular needs of the individual.

8. Mastering Learning

The curriculum should stress the performance criteria of the child to ensure mastering particular areas of knowledge and skills.

9. Holistic Performance Evaluation

The curriculum should adopt holistic approach in setting up of teaching and learning situations and evaluation, and not a segmented approach.

10. Coping with and/or managing change

The curriculum should reflect that we are in an era of rapid social change, it should provide knowledge and skill to the learner to adapt effectively to such change.

For each of these trends in curriculum reform, specific competencies have been identified as necessary for teachers, by Regional study group on Teacher Education in Thailand in 1990. "The competencies are as follows:

1. *Education for All: An ability to:*
   - accommodate diversity in learners;
   - enhance learner achievement, and so:
     - evaluate achievement against agreed norms,
     - interpret the norms set for achievement and the results of evaluations undertaken and
     - sustain/motivate learners to maximize achievements levels.
   - convert intended learning outcomes regarding the curricula into relevant applications;
   - nurture life-long learning skills.
2. *Relevance of the Curriculum to the Individual and Society: An ability to:*
   - apply knowledge and skills to the real life problems of learners;
   - facilitate learning that is relevant to the learner's own background and existing knowledge, while at the same time also moving on from this point to wider considerations;
   - nurture motivation for learner performance;
   - make societal/macro concerns relevant to individual learners.
3. *Development of Appropriate Values and Attitudes: An ability to:*
   - develop learning environments /situations that will help develop "appropriate" attitudes and values.
   - deal with conflict situations which may arise when there is a clash of values/attitudes in various situations, either

between different individuals or else between the individual and society.

- evaluate growth and maturation of attitudes and values in learners.

4. *Development of Process Skills: An ability to:*

- identify the various process skills, these being: thinking; evaluating; observing; measuring; classifying; finding space/space and space/time relationships; using numbers, organising data and communicating; inferring; predicting; formulating; hypothesis; defining operationally; identifying and controlling variables; experimenting; and interpreting data and drawing conclusions;
- identify appropriate process skills for particular learning and teaching situations;
- evaluate the limitations of particular process skills for particular situations.

5. *Meeting the Needs of the Whole Individual: Ability to:*

- recognise learners' many domains of development and the interaction among these domains;
- recognise that learners' development occurs at different rates and at different times;
- create appropriate learning situations in the light of the previous two points;
- develop evaluation methods that reflect the holistic nature of the learning and the learner.

6. *Maximizing the Full Potential of Each Child Irrespective of their Socio-Economic and Cultural Characteristics, with special relevance to the needs of disadvantaged population groups: An ability to:*

- diagnose the needs of each learner in terms of their socio-economic, cultural, physical, cognitive and affective characteristics;

- identify and appreciate the benefits and limitations of the characteristics of disadvantaged children and the implications of these for the choice and implementation of appropriate learning/teaching methods and materials;
- identify the strengths and shortfalls in learners and then adopt teaching/learning techniques and materials that mobilise and enhance the strengths and compensate for the shortfalls.

7. *Learner-Centred Learning and Teaching: An ability to:*
   - mobilise and enhance learner activities and interaction in the learning situation;
   - match the learning and appropriate teaching/learning content and materials, to the individual attributes of the learner;
   - encourage initiative and independent study skills on the part of learners;
   - use various forms of learner-centred methods of assessment such as criterion referenced assessment techniques.
8. *Mastery Learning: An ability to:*
   - facilitate initial learning, reinforcement of learning and the application of learning;
   - provide for the prevention, discouragement and minimization of learning difficulties;
   - provide for remedial learning and instruction.
9. *Holistic/Performance Evaluation: An ability to:*
   - ensure that there is consistency between whole-learner development and the multi-evaluation modes appropriate for a particular learner;
   - use evaluation information to plan appropriately sequenced teaching-learning activities for the learner.
10. *Coping with and/or Managing Change: An ability to:*
    - identify that change is occurring in society and to map the nature of these changes in terms of directions, quality, etc.

- discriminate between the changes that need to be coped with and those that can be managed;
- identify competencies to be developed in learners in order to achieve those things identified in the previous two points;
- provide for appropriate learning opportunities to achieve the above;
- evaluate how the learners perform and to make and implement any necessary adjustments;

The teacher competencies listed under each mega-trend in the curricular reform are just a few illustrations and are not exhaustive."[23]

New Initiatives in Teacher Education in India[24]

The participation of Indian educationists and educational administrators in the activities of APEID, from 1974 onwards, and the new education policy of 1986 have given the impetus for; (a) setting up of District Institute of Education and Training (DIET); (b) strengthening of college of teacher education; (c) upgrading selected colleges of teacher education to institutes of advanced educational studies; (d) strengthening SCERTs and (e) strengthening university departments of educational sciences. The objective is to diffuse the teacher training programmes and encourage retraining of teachers to update their knowledge and skills.

(1) Establishment of DIETS

DIET is a new type of educational institution designed to improve and enrich academic background of elementary school teachers, non-formal and adult education functionaries and other personnel from the lowest level of educational system. DIET has the following functions;

(a) Pre-service and in-service education of elementary school teachers.

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[23] APEID, *Towards Developing New Teacher Competencies in Response to Mega Trends in Curriculum Reforms:* Report of a Regional Study Group UNESCO PRO. FAP. Bankok 1992.

[24] Based on: APEID, *Innovations and Initiatives in Teacher Education in Asia and The Pacific Region*, Vol. 2, Case Studies, UNESCO, Bankok 1990.

(b) Teacher induction and the continuing education of instructors and supervisors for non-formal education and provision of resource supports to them.

(c) Planning and management support for district-based education, school complexes and educational institutions.

(d) Serving as an evaluation centre for primary and upper primary schools, as well as non-formal and adult education centres.

(e) Provision of services as a resource and learning centre for teachers and instructors.

(f) Educational technology and computer education support for the district experimentation and research.

(2) Strengthening Colleges of Teacher Education

In order to prepare quality teachers for the secondary and higher secondary stages, the colleges of teacher education are required to be strengthened. These colleges are expected to remove the deficiencies that exist in the secondary teacher education programme and make an attempt to bridge the gap between theory and practice, with proper specialisation of teachers in both content and pedagogy, and to enhance the capability of teachers to use effectively the media support in teaching-learning transactions. The following functions are visualised: (a) Organising pre-service teacher education courses for graduates and post-graduates at secondary and higher secondary level; (b) Organising in-service education programmes for secondary school teachers; (c) Providing extension and other support services for school complexes; (d) Conducting experimentation research and innovation in school education; (e) Providing training and resource support for the new areas of educational concern such as value-oriented education, work experience, population education, environmental education, educational technology, computer literacy, vocationalisation and science education; (f) Providing support to professional bodies of teacher education; (g) Encouraging community participation in teacher education programmes; (h) Developing and conducting programmes of community work in teacher education courses.

(3) Institutes of Advanced Educational Studies

These are comprehensive institutions of teacher education offering programmes relevant to various stages of teacher education. Research, experimentation and innovations in teacher education and development of software for educational purposes are its important functions. The other functions are to prepare personnel for DIETs, conduct courses in elementary teacher education programmes for graduates, conduct in-service programmes for both elementary and secondary teacher educators, organise pilot programme in teacher education, prepare research workers, conduct advanced level, fundamental and applied research and experimentation on education which are interdisciplinary in nature.

It was proposed to establish at the 7th plan period one DIET in each of 432 districts, about 200 colleges of education and 50 colleges to be selected for upgrading as Institutes of Advanced Educational Studies. However, the achievement upto 1991-92 are 287 DIETs, 25 CTEs and 12 IAESs. (By 1997-98, nearly 430 DIETS have been established)

The contribution of NCERT to the activities of the above programmes is the development of sample materials in the form of; (a) frameworks for curriculum for teacher education, (b) guidelines for developing curriculum and exemplar materials for teacher education, and (c) teacher training packages for in-service training programmes.

3.7 SUMMARY

The presentation made so far in this chapter on international co-operation in teacher education has brought out clearly the contributions of subject experts, educationists and educational administrators from developed countries in framing teacher educational policy, setting up of institutions and programmes, and in giving leadership in teacher education during the first three decades of Independence. Indian teachers, educationists and other educational functionaries have had exposure and training in various institutions and universities in the developed world. Some of the innovations of other countries such as microteaching and models of teaching have been adapted and institutionalised in the Indian system of education. At present, the focus of international co-operation is on the universalisation of primary education, modification of pre-service and in-service primary teacher education programmes and community participation.

The other new development since the 1970s is the introduction of the regional programme APEID supported by UNESCO and UNDP. The programme APEID facilitates education exchanges among the members of the Asian and Pacific region countries through a network of national institutions in this region and assists the countries in building up their national capabilities to design and develop educational innovations and exchange experiences through mutual co-operation in the field of teacher education.

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CHAPTER IV

SCIENCE EDUCATION

4.1 ADVENT AND EVOLUTION OF SCIENCE EDUCATION IN INDIA

Ancient Period

The history of science in India is as old as the Indus Valley Civilization (2300 B.C). The system of weights and measures was widespread throughout the civilization. During the Vedic Period, from 1500 BC to 600 BC, astronomy, mathematics, medicine, biological science and chemistry flourished extensively. The Sulvasutras, which were part of Yajurveda, used the "Pythagorean" theorem to solve problems of equal areas and made the rational approximations of square root of 2 & 3. The decimal system and the number '0' are contributions made by India. Logic was very much developed in unfolding generalisations and refining ideas. Indians possessed knowledge about the course of the sun, phases of the moon, occurrence of eclipses, measurement of time, meridians, equinoxes, solstices and planetary motion.

During the Post Vedic period (600 B.C. to 400 A.D), the science of herbal medicine, known as Ayurveda, was well known and was used in preserving human, animal and plant life. The Charaka Samhita and Susruta Samhita speak of internal medicine and surgery. There were great advances in plastic surgery, laparotomy, lithotomy and cataract operations. In the field of Metallurgy, people knew of metalsmithy and production of glass objects.

The period 200 A.D to 1200 A.D., which is known as the high period in mathematics, produced many great mathematicians like Aryabhatta, Brahmagupta, Mahavira and Bhaskara II. Important contributions were made to mathematics like rational approximation of Pai, correct formula for areas of circle and trapezium, solutions for indeterminate equations, general formula for a combination of 'r' objects from a collection of 'n' objects, solving of quadratic equations of type $ax^2 + bx = c$, operations with zero and negative numbers. The idea equivalent to derivative was also known.

In ancient India, the knowledge and skills formed part of individuals and were passed on only to their disciples. In the absence of widespread dissemination, most of the knowledge was lost in course of time.

Medieval Period (12-18 Century A.D)

During this period, Arabs invaded India from west & central Asia. Exchange of scientific knowledge took place between Indians and Arabs. Great works were translated from Sanskrit to Arabic and vice-versa.

In the field of mathematics, Euclid's Elements were translated into Sanskrit and Bhaskara's Lilavathi and Bijaganita made way into Persian. Emperor Akbar introduced mathematics as a subject of study in the education system. The Kerala School made significant contributions to the expansion of power series.

Astronomy manifested itself in the form of observatories in Ujjain, Banaras, Jaipur and Madurai. Extensive observations were recorded in astronomical tables in both Sanskrit and Persian.

Two new systems of medicine, Rasachikitsa (non Ayurvedic in its approach) and Unani Tibb based on Greek system were developed. Later the Unanic system got mixed with some Persian and Indian systems of medicine and exist even today, as practised by Hakims.

The art of papermaking, production of gunpowder, pyrotechnics were the great advancements made in the technological field during the medieval period. During this time, there was a substantial exchange of knowledge between India and Arab countries.

Modern Period

Modern science entered India with the advent of Westerners in the beginning of the 19th century. The development of science education in India imitated the pattern in Britain but at a slow pace. Nevertheless, India had produced mathematical geniuses like Ramanujam, Nobel Laureate in Physics Sir C.V. Raman and eminent scientist J.C. Bose and many more fellows of the Royal Society of England, even before India attained independence in the year 1947.

Great scientific discoveries were made in the Western World in the 18th century. Many theories like those of Darwin and Copernicus were challenged. Yet the teaching of science in schools started only towards the end of the 19th century.

Modern science came to India when it had already made a headway in the development of newer branches of science and heuristic methods of getting information and technological breakthrough in the Western World. But in India, it remained only as an academic discipline. Indian society was not tuned to the acceptance of modern science for many reasons. Scientific knowledge was in the English language, foreign to our country, which made its assimilation into Indian culture difficult. Also, the attitude of the people of India to anything foreign was generally hostile. As such, technology did not make any headway in the existing trades of artisans and craftsmen in India. The country remained backward in the development of modern science as compared to contemporary Western World. Science was not a school subject even at the beginning of the 20th century.

During and around the World War II, the advancement of science and technology in medicine, agriculture, industry, communication, transportation and production of war machinery progressed manifold all over the world. Science and technology made their dent in all the fields of life, providing man with material and cultural comfort.

4.2 SCIENCE EDUCATION IN THE DEVELOPED WORLD

The introduction of science disciplines in schools as subjects was not realised in European countries, till the end of the 19th century. There was a traditional dominance of the classical literary curriculum at the secondary level. In Germany, separate schools for science were established as early as 1860. In France, appropriate scientific discipline courses were incorporated in the existing colleges and lycees from 1852 onwards. In England & Wales, science was introduced in the schools only after 1902. But Japan, in need of rapid industrialisation, systematically brought-in English educational ideas between 1872 and 1876. By 1903, it had created some 200 secondary schools and to 340 academic secondary schools to provide distinct alternative course through the educational system.

In USA, Science Education was introduced in high schools towards the end of the 19th century. The American high school science education was more flexible than the European, in accommodating a variety of science courses like academic, vocational and technical in response to perceived local needs. Both in USA and European countries, Elementary Science included nature study, hygiene and physiology and stressed the utility and application of science for senior students. Science was taught as an application of scientific knowledge rather than a process. In Secondary Schools, the early method of teaching science was based on textbooks and lecture method, which was changed to laboratory based teaching in the USA and pupil based practical work in the UK, France, Germany and, to some extent, in Japan.

The Second World War transformed the role of science and hence science education in industrial society. The advancement of science and technology in the fields of medicine, agriculture, industry, communication, defence, production of war machinery and transportation made a revolutionary dent and provided people with material and cultural comfort. The importance of a scientifically literate person was greatly recognised and the shortage of such persons became a matter of great concern. This prompted a wave of science curriculum development. The departments, research institutions and organisations of science were established by providing private and government funds. Quite a few modern science courses, which were discipline centred, laboratory based and founded upon a problem solving philosophy, were designed.

Around 1950, Americans felt that their system of science education was weak. There was sharp criticism of the decline in academic standards at all levels of American science education and wide spread debate on the deficiencies of the American system. In order to develop a national policy for the promotion of research and education in science, the National Science Foundation was established in 1950. Institutions, organisations and departments in secondary education were imparted with fresh vigour. Funds were provided from the private foundations and government to develop modern science courses as discipline centred, laboratory based and founded upon inductive and problem solving philosophy. This was to encourage students to behave like practising scientists.

The launching of the Russian Sputnik in the year 1957 alerted Americans to the Russian supremacy in science and technology in the world. Americans compared their 17-year-old student with his Russian counterpart and found that the Russian student knew more science than the American student did. The educational system of USSR trained a large number of scientists and technologists by introducing science and mechanics in a graded form throughout the school course. So, in the face of the Soviet challenge, the then American President Eisenhower recommended an expanded programme for National Science Foundation (NSF) for promoting science education and training in the universities through grants and fellowships to individuals. He recommended a new programme of Health, Education and Welfare (HEW) to strengthen general education and complement the activities of the NSF. Many private groups like Ford Foundation, Alfred P. Sloane Foundation, Carnegie Corporation and others came forward to finance the programmes.

Major American curricular reforms followed. Study groups were formed, funded by private foundations, to study the problems in science education and to find solutions to remedy the situation and develop new science education programmes. Research scientists, Nobel Laureates, university professors and schoolteachers worked together and brought out new curricular programmes which were field tested, critiqued, experimented and revised. These efforts of Americans soon caught up in European countries specially Britain. The British white paper on Technical Education aimed at strengthening the foundation of the education system, improving the economy of the country and thereby of the quality of life of its people.

The major curricular reforms of that time that later influenced science education in India were as follows:

First Generation American Projects: The first generation programmes viz.; Physical science study, Chemical Equation Material Study, Chemical Bond Approach Project and Biological Science Curriculum Study,were single discipline programmes more suited to academically able students. The emphasis was on concepts rather than facts and lab work was based on the inquiry approach. The subject specialists had a dominant influence compared to science education and curriculum specialists. The content and objectives had a more logical relationship than in the then existing courses.

Second Generation American Projects: In the second-generation projects, viz. Harvard Physics Project the Earth Science Curriculum Project, American Association of Advancement of Science (A.A.A.S), Elementary Science Study sponsored by the Education Services Incorporated, Minnesota Mathematics & Science Teaching Projects, Science Curriculum Improvement Study, University of Illinois Elementary Science Projects and also Science Teaching in England and Nuffield Foundations Science Teaching Project-1962 (the last two from U.K.) had the dominance of science educators, educational physiologists and specialists in the field of educational technology and curriculum. The role of scientists had declined. Programmes were made for all levels of school education and for all groups of students such as average, below and above average. The content of science was placed in its historical/cultural context in order to focus science as a human activity. The second generation programmes also focused on the social consequences of science such as environmental degradation, pollution and threat of nuclear war. This perspective of science contributed to the development of environmental education and an integrated approach to science. In the integrated science approach, a topic or a theme embraced more than one science discipline and the specific discipline might not be identified. It was claimed that the integrated approach helped in presenting the structure of science and for developing scientific literacy. The extension of the integrated approach gave birth to modular programmes.

A general discontent with science education of primary schools after 1950 surfaced in Europe and America. The reformation in secondary school science led to the reformation in primary school science curriculum. Projects begun in the West in the early 1960's were: (a) Elementary Science Studies (ESS), (b) the Science Curriculum Improvement Study (SCIS), (c) Science — A Process Approach (SAPA), (d) The Oxford Primary Science Project and (e) The Nuffield Primary Science Project and Science 5/13.

During the 50's, the US National Science Foundation, the Soviet Academy of Sciences and Academy of Pedagogical Sciences, and the Nuffield Science Foundation made pioneering contributions in initiating a revolution in teaching science and mathematics.

By the mid-1960's, more and more countries, both developed and developing, were being influenced by the American & British reform movements in science education. There was greater interaction between nations and new programmes were generated. The research associated with them produced new knowledge and ideas and they were tried elsewhere.

During the 60's and 70's, science education became one form of aid from the developed countries to the developing ones. Some developing countries formed some central agencies to determine the project to be taken up, co-ordinate and initiate adaptations and new programme developments. The multinational agencies like UNESCO, UNDP & UNICEF helped these countries in establishing the new projects and co-ordinating their appropriate adaptation through the central agencies.

4.3 SCIENCE EDUCATION POLICY INITIATIVES IN INDIA

Introduction

After India attained independence, it soon realised that technology was a key factor for economic development. The study of science, which is the basis for the development of technology, should therefore be a basis for the development of Indian education & culture.

India had before it the experiences of developed countries like the USSR and Japan who could rise their GNP rapidly and were transforming their stagnant economy into industrial economy by investing in basic science, technology and education.

If the country wanted to progress, it had to constantly improve its technology by research/invention/discovery and also produce highly skilled personnel. These personnel at different levels needed basic science as their requirement and also to be tuned to adopt scientific process. Attributes called for in all the activities are observation, data collection, data classification, interpreting data, inferring and developing attitude, logical thinking, etc.

Thus high priority was given to reorganise Indian education. Several committees and commissions were set up from time to time to look into the problems of education in India and suggest remedies to improve it.

University Education Commission

The University Education Commission recommended that "as a part of general education for living, every step of education from primary school to the completion of undergraduate university education, should include teaching of science".[25] It recommended two different types of courses for science and non-science students. Even though Secondary Education was a state subject, the constitutional responsibility of maintaining standards in higher education and technical education was that of the Central Government. The University Education Commission expressed emphatically that reconstruction of University Education would not be possible unless Secondary Education is remodelled. Therefore, the Government of India appointed the Secondary Education Commission in 1952.

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[25] Ministry of Education, *Science in General Education*, The Report of University Education Commission (Dec1948 - Aug 1949), Published by the Manager Publications, Delhi, 124.

Secondary Education Commission

The Secondary Education Commission (1952-53) was set up to make recommendations for improving secondary school education. Principal John Christie from Oxford, UK and Dr. Kenneth Rost Williams from the USA were the members of the commission from abroad. The commission stated that "To be effective, a democratic citizen should have the understanding and intellectual integrity to sift truth from falsehood, facts from propaganda and to reject the dangerous appeal of fanatism and prejudice, he must develop a scientific attitude of mind to think objectively and base his conclusion on the tested data".[26] Accordingly, the commission considered the understanding and appreciation of fundamental principles of natural and physical science as essential to effective living in the world today. Thus, science education in school gained importance. The Commission recognised "general science" courses for upper primary stage with emphasis on practical applications and observations and specialised science course with Physics, Chemistry and Biology as independent disciplines at high school stage.

All India Council of Secondary Education

In the year 1955, to take care of the organisational and administrative problems involved in the implementation of Secondary Education Commission, the All India Council of Secondary Education (AICSE) an autonomous body, was formed under the Central Ministry of Education. It was both an advisory body and an executive body. A team of experts under Technical Co-operation Mission (UNESCO Mission) was attached to the council to give expert advice.

With the assistance of Ford Foundation and Technical Co-operation Mission, AICSE implemented three projects in the year 1955-56. These were; (a) Extension Services Project, (b) Seminars and (c) Workshops in Secondary Education.

Under Extension Service Project, 23 Extension Service Departments were opened in 23 postgraduate training institutes to provide in-service training to teachers through seminars, workshops, conferences and exhibitions. Research projects were undertaken in 21 teachers' colleges for improving teaching and promoting research. Another long-range programme undertaken was examination reform drawn up with the help of Dr. B. S. Bloom of University of Chicago who conducted various workshops and trained personnel. A large body of secondary school teachers and educators was oriented towards new evaluation techniques.

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[26] Ministry of Education, *Role of Education in Developing Democratic Citizenship*, Report of the Secondary Commission (Oct. 1952 - June 1953) First edition, 1965, published by the Manager of the publications Delhi. 20.

In the year 1956-57, under the project "Strengthening of Science Teaching in Secondary School", 40 Indian Science Teachers were deputed for a study-cum-training course to the USA, the UK, and Canada in collaboration with Ford Foundation, the United States Educational Foundation in India (USEFI), the British Council and the Canadian High Commission. On their return, a seminar was arranged to develop a plan for the utilisation of their experience and knowledge with appropriate adaptation in improving teaching of science in secondary schools. During 1960-61, under the same programme, 465 science clubs were established as a part of science education programme in selected schools and training colleges. In 1959, the AICSE was reconstituted purely as an advisory body and the Directorate of Extension Programme for Secondary Education (DEPSE) was established as an executive agency to implement the approved schemes in the field of secondary school education. In the implementation of the programmes, the Ministry of Education was influenced not only by American know-how but also by their generous assistance in the form of funds. By the end of the IInd Five-Year Plan, General Science was introduced in almost all secondary schools while science as an elective subject had been introduced in about 4625 schools.

All India Seminar on Teaching of Science

In the year 1956, the All-India Seminar on Teaching of Science went into the detailed aspects of teaching science in higher secondary classes. These included syllabus, text book and equipment, teaching aids in science, examinations, science clubs and museums. It recommended a uniform system of science teaching for the entire country. A document entitled "Proceedings of the All India Seminar on Teaching of Science" was published.

Science Policy Resolution

The Science Policy Resolution introduced by Pandit Jawaharlal Nehru was adopted in the Parliament in the year 1958. It stated, "the dominant feature of the contemporary world is the intense cultivation of science on a large scale and its application to meet the country's requirement". In pursuance of this policy, the Government of India established a network of national science institutions to provide leadership in research. Many conferences of scientists and educationists were organised towards this end.

Indian Parliamentary Scientific Committee

In view of the rapid influence of science in society and on government policies, it was felt that both scientists and politicians should be brought on a common platform to form new policies and procedures. The Indian Parliamentary and Scientific Committee (IPSC) set up in August 1961 took up the study of Science Education in Schools with a view to finding out the relations between State/ Government policies and decisions and the courses offered in schools. Analysing the objectives of science teaching and the content of school science, the IPSC observed that "during the last 25 years, objectives of science teaching have changed little, while changes in the nature of science that ought to be taught have greatly changed.... There is a gulf between what is being taught and what ought to be taught".[27]

The study group appointed by IPSC listed the difficulties in school science education, which were impeding the cultivation of science on large scale and its application to meet the country's requirement. The Committee pointed out the difficulties created by structural changes in Secondary Education, improvement in curriculum and syllabus of Science and Maths, difficulties in securing science teachers, paucity of adequate laboratory equipment, lack of suitable text books in different subjects and early specialisation.

The Committee recommended uniformity of courses and class structure in all the states, modernisation in school science curriculum on the basis of courses introduced in some of the advanced countries such as UK, USA, USSR, Japan, France and Germany and postponement of specialisation as far as possible.

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[27] Ministry of Education, *Science Education in Schools*, May 1965, Report of the Indian Parlimentary and Scientific Committee, Published by NCEAT, 16, Ring Road, New Delhi. 15.

IPSC also laid stress on preparing instructional materials in science on the lines of those prepared by Physical Science Committee (PSSC) of the USA and to have similar books for all stages. *The recommendations of this committee regarding teaching of science in schools were as follows:*

(a) Should study science as nature study in the primary school, general science in Standards VI, VII or VIII. Physics, Chemistry, Biology as separate disciplines at the high school stage.

(b) Should make general science compulsory for all the students and as elective science for those who want to take up science at the higher secondary stage.

(c) Should include life history of great scientists in language lessons.

(d) Should take up periodical improvement of science syllabus and modernisation of school curriculum, upgrading science textbooks at the state and national level by a committee consisting of specialists from universities and teachers of secondary schools.

(e) Should conduct Summer Institutes for secondary teachers in science subjects.

(f) Should introduce internal assessment of students' records and laboratory work.

(g) Should provide simple science apparatus to students, improved conditions of service to teachers, setting up of museums, preparing handbooks for teachers and students, organising periodical conferences of science teachers and improved school buildings and laboratories.

Follow-up Science Education Activities during Early Sixties

In 1961, the Government of India with the Union Minister of Education as its president established an autonomous body called

National Council of Educational Research and Training (NCERT). To improve school education, the National Institute of Education (NIE) was set up as a constituent unit of NCERT. The Department of Science Educlation (DSE) as a unit of NIE started in 1963. A Central Science Workshop was established as a part of NIE and assisted by UNESCO/UNICEF in the form of experts, fellowships and funds to produce prototype school equipment and to develop low cost science kits for the primary and middle school stage.

In December 1963, the Government of India sought the expert advice of UNESCO on the desirable form of science and mathematics education at the school stage. The UNESCO planning mission visited India from Dec. 1963 to March 10, 1964, under the UNDP Technical Assistance project for improvement of secondary school science and maths education in the country. They made a thorough study of the status of science and maths education in India and gave a very comprehensive report, constituting 6 parts. The first part related to "Scientific Technical Progress" and "Science and Mathematics Education". The recent achievement in Physics, Chemistry and Biology and their implication for school science had been discussed. Part II discussed the Science and Mathematics Education in Class I to VIII and content of science and mathematics education in Class IX to XI, science and maths education in polytechnics and also principles of preparation of text books. Part III was related to teaching equipment, science subjects and planning of lecture rooms and laboratories and establishment of a Central Science workshop for manufacturing scientific equipment. Part IV discussed teacher training, Part V pertained to research in Maths and Science education and Part VI gave the sequence of implementing the recommendation and deputation of Indian specialists to U.S.S.R. for further training.

One of the most important recommendations of this mission was the abolition of General Science for middle school and the introduction of Physics and Biology in Class VI and Chemistry in Class VII.

The next important development was the conference on science education held in the year 1966 under the chairmanship of Dr.Kothari to develop a total curriculum of science education at all levels of education. The conference was attended by the UNESCO experts along with American, Russian and Indian experts.

During the third five-year plan, State Institutes of Science Education (SISE) were set up in all the states for planning and implementing improved programmes in all aspects of science.

National Education Commission (1964-66)

The National Education Commission under the Chairmanship of Prof. D. S. Kothari was set up in 1964. Among the principal recommendations of the commission, the one on the science education and research states that "with a view to accelerating the growth of the national economy, science education and research should receive high priority. Science and Mathematics should be an integral part of general education till the end of school stage".[28]

The objectives and purposes of science teaching were "...to promote an ever deepening understanding of basic principles, to develop problem solving and analytical skills and the ability to apply them to the national environment and social living and to promote the spirit of enquiry and experimentation. Only then can a scientific outlook become part of our way of life and culture".[29]

The commission pointed out that science education in India was in very bad shape and, to overcome this, the commission recommended research in curriculum development, revision of textbooks and teaching-learning materials.

The main recommendations pertaining to science education in schools were as follows:

(a) Science and Maths should be taught as a part of general education during the first ten years of schooling.

(b) In the lower primary stage, science should be related to the child's environment. Roman alphabets should be taught to understand internationally accepted symbols used in major charts and statistical tests.

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[28] NCERT, *Education and Development.* Report of the Education Commission 1964-65, Second Edition, 1970, published by N.A.Abidin, Secretary NCERT NIE Campus, New Delhi - 16 XVIII.

[29] Ibid., p.12.

(c) At the upper primary stage, in order to develop logical thinking and draw conclusions and make inferences, Science should be taught as different disciplines. Class V: Physics, Geology, Biology, Class VI: Physics, Chemistry, Biology, Class VII: Physics, Biology, Chemistry and Astronomy.

(d) A science corner in the lower primary school and laboratory cum lecture room should be used in science teaching in upper primary and secondary schools.

(e) At the upper primary stage, science should be developed as a discipline of the mind and science discipline concepts should be taught using experimental approach.

(f) For talented students, advanced level science should be provided in selected lower secondary schools with necessary staff and laboratory.

(g) Science should have an agricultural bias in rural areas and a technology bias in urban areas.

(h) The method of teaching science should be investigative in order to promote understanding of the basic principles. Handbooks and guides should be prepared and given to teachers to help them in their teaching. Lab work should be improved and curriculum should be flexible to meet the needs of the pupils.

(i) The cultural and spiritual heritage of India should provide nourishment for the development of science.

(j) Better conditions of research in science should be provided at the university level.

The National Education Commission (1964-66) recommended a broadly uniform educational structure in all parts of the country and the new structure followed a 10+2+3 pattern. In this pattern, ten years of schooling is followed by two years of higher secondary schooling, after which students may go for the first year of three years degree course.

National Policy of Education (1968)

The National Policy of Education 1968, a very significant step in post independence India, was mainly based on the recommendations of the National Education Commission. It laid stress on the radical change of educational system in India to improve the quality of education at all stages, to improve science and technology education and to provide an education relevant to life and cultivation of moral values.

Major outcomes of the implementation of the 1968 policy are as follows:

(a) The considerable expansion of education facilities all over the country with 90% of rural areas having schooling facilities.
(b) The acceptance of a common structure of education of 10+2+3 system in most of the states.
(c) The adoption of a common system of studies for boys and girls.
(d) Introduction of Science and Mathematics as compulsory subjects.
(e) The provision of work experience in schools.

Scientific Advisory Committee

As per the recommendations of the National Policy of Education, a Scientific Advisory Committee to the Cabinet was set up. This committee consists of major agencies concerned with scientific research persons who have a high standing and regard in their profession and who can be from universities, research institutions, industry and public life. This body has to assess the broad scientific needs of the country including the universities, and advise government on scientific policy and allocation of resources for scientific activities.

Environmental Dimension of Science Education

The world's concern for the deterioration of human environment resulted in United Nations Conference in Stockholm in the year 1977. The conference was attended by 113 nations. It recommended the development of environment education as a powerful instrument to help solve environmental crisis. It urged UNESCO and other international agencies to take necessary steps to establish an International Environmental Education Programme (IEEP), interdisciplinary in approach, in school and out of school, encompassing all levels of education. Thus environmental education received a strong emphasis after this. IEEP is making significant efforts toward the incorporation of the environmental dimension into the educational system.

Environmental Education was a part of the education system in some of the public schools at Calcutta and Madras even before 1972. In the year 1972, the Ministry of Education, Government of India, wanted to bring in an uniform pattern of 10+2+3 school and college in all States/UTs of the country. To develop a model curriculum for the 10+2 pattern of schooling, an expert committee was appointed. At a National Conference in 1975, attended by 200 educationists from all over the country, the model curriculum for the Ten-Year School — A Framework was finalised

The Model Curriculum recommended a composite course known as "Environmental Studies" (ENVS) to be introduced in Class I & II, which includes both the natural and the social environment. The teachers' guide on environment studies provides illustrative examples of environment topics under seven units - Our Family, Our Home, Our School, Our Neighbourhood, Our Earth, Our Sky and Stories. It aims at orienting teachers and curriculum developers in ENVS approach and enables them to develop instructional materials at the local level and to implement effective teaching.

In the Classes III, IV and V, they have ENVS (I), and ENVS (II).

The contents of ENVS (I) are drawn mainly from social sciences such as History, Geography and Civics. Geography covers a major portion of ENVS. It contains local geography of the state to which the child belongs, life in other parts of India, natural resources of the country and the life and occupations of different people in different environments in various parts of the world.

ENVS (II), has its contents in natural science such as plants and animals around us, housing and clothing, our food, our health and sanitation, natural resources of the earth, erosion and how to check it, how seasons affect our life, what makes things move, machines to do work, the earth and the sky, sun, shadows and eclipses. The teaching -learning activities are based on the use of environment and local resources.

At the upper primary stage, or at middle school level, the science is introduced as Integrated Science and has social relevance. The content is selected not as a part of any discipline but as a component of the environment. It is expected that the child, while learning, understands the environment, which will enable him to develop desirable values.

At the secondary and higher secondary stage, science in general and biology in particular shows a radial shift in its emphasis from principle-oriented contents on plants and animals to the emerging contemporary frontiers of the disciplines including environmental biology. It prepares students to work and take decisions collectively. At this level, through the geography course, the child is introduced to an understanding of the interaction between man and environment.

At all levels, the following aspects of Environmental Dimension are emphasised: land, resources and their uses, food and nutrition, conservation, pollution, health and hygiene, man and nature.

Special emphasis on environmental dimension is made while designing curricula, framing of syllabus and developing textbooks with a view to make science learning relevant in the national context. The treatment of the various aspects of Environmental Education covers education through environment, about the environment and for the environment in nutrition, health, hygiene, and environmental sanitation and soil concentration. Curricular areas beyond the primary stage integrate Environmental Education with science/social skills.

The Teacher Education Curricula — A Framework (1978) has the following areas in Environmental Education.

(1) Environment Studies I : (General Science) at primary
(2) Environment Studies II : (Social Science) at primary.
(3) Training Package I : (Science) at Secondary (9-10)
(4) Training Package II : (Social Science) at Secondary (9-10)

In the context of the UNESCO-UNDP International Environmental Education Programme, as a follow-up to the Tbilisi Conference Recommendations, with respect to training of teachers in environmental education, a series of experimental modules were developed for pre-service and in-service training of primary school teachers, secondary school science and social science teachers. Two of the modules: (A) The module for in-service training of teachers and supervisors in environmental education for primary schools, (B) The module environmental education — a process for pre-service teacher training curriculum development have been developed by NCERT, New Delhi under UNESCO contract and were published in the year 1988.

"The main objectives of the module A are to 1) foster the acquisition and transfer of knowledge, skills and effective attributes concerning the environment and its problems 2) develop competence in the teaching and supervision of the environmental dimension in primary school. The module treats (a) historical and philosophical development of environmental education (b) essential knowledge about the environment and its problems (c) teaching methodology (d) activities and experiments and evaluation in environmental education and (e) strategies for integration of environmental dimension to school curriculum".[30]

The objective of the module B is "to address itself to a process that may be considered for use by teacher educators in different educational systems for enviromentalisation of their respective curriculum which may involve the incorporation of environmental education into the teacher education objectives, contents and methods of evaluation horizontally at one level and vertically at different levels".[31]

The document focuses on (a) goals, objectives, and guiding principles of environmental education (b) the need for environmental education in teacher training (c) essential elements of environmental

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30. Atreya, B.D., et al. (1965), preface, *Environmental Education, Module for Inservice Training of Teachers and Supervisors of Primary Schools*, prepared by NCGAT, Edited by Prof. Willard J. Jacobson, Columbia University, New York, USA, Environmental Educational Services 6.

31. Lahiry, et al. (1988), preface, *Environmental Education. A process for pre-service Teacher Training Curiculum Development*, prepared at NCGRT, Edited by patricia et al Southern illinois, University of Carbondale, Environmenttal Education Service 26.

education in teacher training (d) the process of curriculum development in environmental education for pre-service teacher training (e) teaching methodologies, strategies, foundation education and its environmentalisation (f) evaluating the context of environmental education learning and mechanism of development.

National Education Policy-1986

Successive five year plans, from the second plan onwards, reviewed the progress and future projections in education including science education and determined the policy areas to be implemented and allocated funds to states to implement them. But these reviews and minor changes in the existing system did not serve much in taking the country to further progress. So the Government of India felt that there is a need to formulate the New Education Policy 1986.

But, as it is said in the draft, National Policy on Education 1986 "... the general formulations incorporated in the 1968 policy did not however, get translated into a detailed strategy of implementation, accompanied by the assignment of specific responsibilities and general and organisational support. As a result, problems of access, quality, quantity, utility and financial outlay, accumulated over the years, have now assumed such massive proportions that they must be tackled with the utmost urgency".[32]

National Education Policy (NPE) of 1986 emphasizes that science education should be strengthened to develop in a child the spirit of inquiry, creativity, objectivity and the courage to question and aesthetic sensibility.

Science and Mathematics would be compulsory subjects upto Standard X. Science education would be designed for the learner to acquire problem solving and decision-making skill and to enable him to discover the application of science in health, agriculture, industry and other aspects of life. Efforts would be made to spread science for those who are outside the formal system of education.

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[32] Compiled by Dr. B.P. Lulla, *National Policy of Education, International Material Series, Pamphlet No.34,* College publication Ltd. Bombay Institute of Education, Colaba, Mumbai-2.

In order to improve the quality of science education and promote scientific temper as envisaged in NPE, a centrally sponsored scheme of improvement in school started in 1987-1988. Under the scheme, financial assistance was provided to:

(a) Provide science kits to upper primary schools.

(b) Upgrade science laboratories in secondary and higher secondary schools.

(c) Set up distinct resource centres for science education.

(d) Develop instructional materials.

(e) Train science and maths teachers.

4.4 MAJOR PROJECTS AND PROGRAMMES IN SCIENCE EDUCATION INVOLVING INTERNATIONAL CO-OPERATION

4.4.1 SUMMER INSTITUTES IN SCIENCE

A specially designed programme for the improvement of Science teachers both at secondary and under graduate level was started in the year 1963. The National Council of Educational Research & Training (NCERT) and the UGC jointly organised these programmes with the collaboration of USAID and the National Science Foundation (NSF) USA. Under the USAID contract, American consultants from the Teachers' College of Columbia University, Ohio State University, the University of Houston and the University of Wisconsin helped in conducting these programmes.

The Summer Institutes introduced Secondary School teachers to new developments in science and acquainted them with modern curricula and new techniques of teaching and demonstration, which were developed in USA during the 50s, a period of their curricular reform.

The objectives of the Summer Science Institutes were as follows:

(a) To bring about interaction between schools and universities.

(b) To acquaint the teachers with the recent developments in the science subjects.

(c) To make them understand the basic concepts in science and develop competency in the subject matter.

(d) To enable teachers to conduct experiments using improvised apparatus wherever possible.

(e) To stimulate interest in teachers by bringing them into contact with eminent men in the field.

(f) To enable teachers to exchange views with their colleagues for better understanding and appreciation of each other's teaching problems.

(g) To strengthen the capacity of teachers for motivating able students to develop an aptitude for research.

A striking feature of the Summer Institutes was that it brought together school and college teachers in active participation with leading Indian & American University Professors. The Summer Institutes used to be of 6 to 8 weeks duration, in the subjects Physics, Chemistry, Biology and Mathematics. The basic materials used in the summer institutes were PSSC Physics, produced by the Physical Science Study Committee, CHEM Study produced by Chemical Education Material Study group, BSCS produced by Biological Science Curricula study and SMSG produced by School Mathematics Study Group. These materials were the results of curricular science reform, which swept America between 1957 and 1960 and were an outcome of the group work of research scientists, Nobel Laureates, university professors and schoolteachers in the USA. They were tested in the field, criticised, experimented and revised. The emphasis in all these materials was on concepts, rather than facts. The laboratory work was based on the inquiry approach. Considerable ancillary materials such as films and supplementary reading accompanied the students' texts and teachers' guides.

The PSSC course consists of four parts which were interconnected: (1) The introduction of time, space and matter, (2) Optics, waves, where both particle theory and wave theory are introduced, (3) Mechanics, (4) Electricity, atomic structure, quantum mechanics and theory of relativity. In addition to PSSC textbooks, there were laboratory guides, teachers' resource books, related films, evaluation tests and supplementary reading materials like science study series. The emphasis was on improvised apparatus rather than complicated apparatus.

The CHEM Study Programme was a laboratory based experimental science: principles grew out of observations made in the laboratory and there was a systematic development of relationship between experiment and theory. The emphasis was on chemical principles and not a descriptive chemistry, and theory was logically developed. The book "Chemistry - An Experimental Science", with teachers' guide, laboratory manual and films to provide experimental evidence was used.

The BSCS study presented a unified Biological Science Curriculum Study based on experimental perspectives. Three versions of high school biology were available in green, yellow and blue to provide for a wider range of student abilities and interests, with different approach. The green version laid emphasis in ecology and evolution. The yellow version laid stress on the cellular approach to plants, animals and microorganisms. The blue version stressed on the molecular and cellular levels. " The study enabled the students to acquire not only an intellectual and aesthetic appreciation of the complexities of living things and their inter-relationships, but also of the ways in which new knowledge is gained and tested, old errors eliminated and progressively closer approximation to truth attained"[33]

In Mathematics, the topics dealt with the nature of mathematics, probability, statistics, vectors, matrices, theory of numbers, etc. Emphasis was on developing the basis and the logical relationships within mathematics and an abstract pattern of thought.

The Summer Institutes which started as pilot project in Madras University, Poona University, Delhi University in June-July, 1963, in Physics, Chemistry, Biology and Mathematics with 150 teachers were very successful and gained momentum in the following years. The number of institutes increased from four in 1963 to 292 in 1971, with

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[33] University Grants Commission and National Council of Educational Reserach and Training (Oct. 1965), *Summer Institutes*, Publication 1. Published by University Grants Commission, New Delhi.

Physics (105), Chemistry (109), Biology (78) and 11,300 teachers participated.

The Summer Institutes were held for teachers of secondary school, PUC, intermediate and training college teachers at different places in different subjects, by NCERT and UGC with the expert assistance made available by USAID.

After nearly a decade, in 1972, the responsibility of running Summer Institutes at the school level was transferred completely to NCERT. The programme was continued up to 1977.

The impression of many of the participants was that, by attending the summer institutes, their understanding of the subject matter was significantly increased and thus the programme was successful but they could not use these materials in the school, as they did not fit into school curriculum course which was rigid and examination oriented.

This problem engaged the attention of UGC and it initiated the Indian adaptation of the American Curriculum Science material to meet the Indian needs. Groups consisting of both school and college teachers from all parts of India developed these materials. The materials prepared by the team were class tested, sometimes researched and the feedback was incorporated and finalised.

The Indian adaptation of the yellow version of the BSCS Biological Science: An Enquiry into Life, prepared by the Biological Sciences curriculum study, University of Colorado, USA, was brought out in two volumes. They were discussed by 31 school and college teachers from all over India, at Madurai University. The materials produced were class tested before their final publication in 1969.

Physics Resource Material Project (PRM) for secondary school-teachers was initiated in the Summer Institute of 1970. The complete Volume I was taken up for research by the staff of RCE at Mysore, involving physics and education staff, 98 teachers from 49 schools and over 2600 students. Based on the findings of the research study and the comments of those who tried the material, Volume II and Volume III were prepared. The PRM was based on the syllabus of the central schools. Each chapter of the PRM contained a sequence of (1) a brief introduction, (2) a list of major instructional objectives stated in behavioural terms, (3) a list of central concepts to be developed, (4) comprehensive development of the subject content in terms of objectives through student learning activities, teacher demonstration and class room discussion, (5) a descriptive list of suggested additional /alternate activities and (6) a set of questions and exercises for student evaluation. The PRM served the purpose of both a text as well as teachers' guide. Though the PRM is intended primarily for teachers' use, it was useful for teacher educators also, in the pre-service and in-service teacher training programmes.

These Indian adaptation projects were guided by American consultants and financially aided by USAID.

The Summer Institute programme in science was so popular that it created an interest in organising summer institutes in selected disciplines outside the field of science teaching such as Geography, Economics, English and Psychology.

4.4.2 UNESCO MISSION

The Government of India was well aware of the importance of modern science and mathematics education in preparing the manpower in agriculture, medical and industrial sectors, which were necessary for the economic growth and industrial development of the country.

In the year 1963, the Government of India decided to seek the advice of the UNESCO in improving the science education in schools. Accordingly, an UNESCO planning mission visited India in December 1963, under the UNDP technical assistance project for Improvement of Secondary School Science and Mathematics Education in the country. The UNESCO planning mission, under the leadership of the USSR expert Prof. S.G. Shapovalonko, stayed in India from Dec.23, 1963 to March 10, 1964. The mission consisted of nine members, six drawn from the USSR and two from the USA. The mission made a detailed study of the maths and science education as it existed in the secondary schools and made a detailed report and recommendations for improvement. The report was organised in six parts namely:

Part I: Objectives of Learning Science and its Long-term and Short-term Goals

The long-term objective of the project was to provide the students with the knowledge of the major achievements of science and technology in the field of medicine, agriculture, industry and culture. This would enable the students to be well prepared,

(a) For life and efficient activity in the modern society.

(b) For enriching themselves with a continued self education after leaving the school.

(c) For higher education of specialisation to help in the development of the economy of the country.

To achieve these long-term objectives, the short-term objectives to be taken care of were:

(a) To provide the students with the knowledge of fundamentals of science and maths.

(b) To acquaint the students with the application of science and maths in medicine, agriculture, engineering, communication and transport and culture.

(c) To equip the students with the necessary tools of knowledge and experience, so that they can get the ability to receive and understand the new knowledge and utilize it in their life.

(d) To develop in pupils (i) the habits of observation, logical thinking and inquiring mind, (ii) interest in science, maths and technology, and (iii) aptitude and ability to study science and maths.

(e) To shape the social conduct to the scientific conclusion in sanitation, hygiene, protection of environment, etc.

(f) To assist students to get a modern scientific world outlook.

Part II: Contents, Methodology of Teaching and Principles of Preparing Textbooks

The contents of science to be studied in Classes I to V (Stage (1), in Classes VI to VIII (Stage 2) and Classes IX to XI (Stage 3).

At Stage 1, the stress should be laid on water, air, earth, plants, animals, human beings, sanitation, hygiene, arithmetic and elements of geometry.

At Stage 2, elements of botany and physics should be taught in Class VI, zoology and chemistry in Class VII, and anatomy and physiology, within the framework of sanitation and hygiene, in Class VIII.

At Stage 3, diversified streams like science, humanities, technology and others should be provided. In the science stream, physics, chemistry and biology should be taught as separate disciplines.

Methods of Teaching Science and Mathematics:-

(a) In the teaching of science, observation, experimentation with theoretical analysis and generalisations should be used. Experimentation should include demonstration, short and simple laboratory experiments and independent laboratory practical work.

(b) The teaching of science should develop in students the qualities of enquiry, inquisitiveness, independent thinking and initiativeness.

(c) Discovery approach to be encouraged in conducting the laboratory experiments.

(d) Evaluation of the knowledge of the students should be continuous and include oral, written, labwork and observations.

In the preparation of textbooks, the following things were suggested:

(a) Science should be linked with practical life.

(b) Text books should provide established facts and also problems created by science.

(c) Textbooks of chemistry and biology should highlight sanitation, conservation of resources, pollution, preservation of nature and other similar problems.

Part III: General Recommendations of Layout, Equipment of Lecture Room cum Laboratories and Establishment of Workshop

The central workshop should —

(a) Examine the equipment already produced by the industry for teaching of science and explore the possibility of improving its quality,

(b) Design and manufacture new equipment and give an experimental trial,

(c) Make use of the expertise, knowledge and experience, both foreign and Indian, for the designing and production of teaching equipment,

(d) Develop new designs for the industry to manufacture.

Part IV:Training of Science Teachers

B.Sc degree holders should be trained either by correspondence course or in evening colleges to teach science of Classes I to VIII. In order to overcome the shortage of teachers, the teachers in the humanities should be trained in science and mathematics, if the teachers desired to be trained. It was also decided that the in-service programme of teachers should be organised on a regular basis to update their knowledge and raise their standard.

Part V: Identification of Areas of Research in Science and Mathematics

Part VI: Sequence of Implementation of Recommendations and type of people to be deputed to USSR for training

UNESCO had agreed to assist NCERT with $2,93,000 for the programme of science teaching in secondary schools, involving supply of equipment and other commodities and service of specialists and 28 fellowships for the training of Indian counterparts which would cost $ 5,13,000 and $ 1,12,000 respectively. This assistance would be integrated with the then ongoing science teacher project.

The UNESCO Mission favoured discipline approach of teaching science for Standards VI, VII & VIII, as it was in USA and USSR and Germany, taking into account the development of scientific knowledge needed in developing qualified cadres for the development of economy and culture, in India. This approach was at variance with the general science approach recommended by Secondary School Education Commission 1954 and IPSC.

The Central Advisory Board of Education (CABE) approved the recommendations made by the UNESCO Mission and its implementation was taken up by NCERT in 1965 under a project called Secondary Science Teaching Project (SSST).

4.4.3. SECONDARY SCIENCE TEACHING PROJECT (SSTP)

A crash programme for the improvement of science and maths education was launched in September 1965. A project for curriculum development took shape and work started in the Department of Science & Maths education of NCERT. Under this project, a new curriculum was formulated, text books and teachers' guides were prepared and teachers were trained with the help of the UNESCO specialists.

It covered three years of middle stage for Classes VI, VII, and VIII. By that time, the report of the Indian Education Commission (1964-66) was also received. The report had strongly recommended the development of curriculum in science and mathematics education at all stages of school education. It also advocated the teaching of science disciplinewise for Classes V, VI, VII and VIII.Later the primary classes were also brought under purview of the project by setting up "Primary Science Cell" in the Department of Science & Mathematics.

The UNESCO experts from USSR guided and participated in the development of project work, instructional materials, training of teachers, etc. Apart from that, 49 Indian Science Educationists from NCERT (including from Regional Colleges) were trained in various institutions in USSR, in different aspects of science curriculum development, pre-service and in-service training of science teachers.

In order to facilitate experimentation and demonstration through discovery approach, it was decided to provide the schools with complete demonstration kits and experimental kits. The central science workshop at the NCERT took up the task of designing and development of science kits in 1968. It developed Physics kits I, II, III, Biology kit and Chemistry kit. A comprehensive portable type of kit for primary schools with built-in demonstration table and a chalkboard and a set of hand tools for further improvisations and repairs were developed. These kits were of two types. One category was meant for class demonstration by teachers and the other one for pupils' practical work. Some kits could serve both the purposes by supplementing a few items from the local market. A pupil kit could serve for six students whereas, a demonstration kit could take care of a class of 35-40 students. The primary school kit was versatile in its flexibility and was useful to accommodate both the types of syllabi. (Variant I and Variant II).

FIRST VARIANT	*SECOND VARIANT*
I to IV Primary	I to V Primary
V to VII Middle	VI to VII Junior Secondary
VIII to X Secondary	IX and X-Senior Secondary

The development of kits was the result of the efforts of subject specialists, material-experts, engineers, costing advisors and market surveyors. The kits had many built-in features such as low cost, strength, portability, and storage facility and could be used as demonstration table. They were like mini laboratories. Kit guides containing a list of items, their sketches and detailed descriptions accompanied these kits. The special features of these science kits were the multipurpose use of items, economy of time in setting up, provision for new innovations and easy replacement of lost or broken items.

The curriculum materials under both the Variant I and Variant II were prepared. In a period of 5 years, by the year 1969, 28 textbooks, 12 teachers' guides and 6 equipment kits and 5 kit guides were prepared. A number of films for teacher trainees were also developed. They were:

(a) Science slide (prepared in collaboration with UNESCO).

(b) Science Is Doing (both Hindi and English).

(c) Teaching Elementary Physics (both Hindi and English).

(d) Primary Science Kit, Physics Kit II, Physics Kit III and Chemistry Kit.

(e) Know Your Biology Kit (in two parts).

(f) Tools and Techniques of Biology Cell Study.

In order to take science to villages, "a laboratory on wheels" was also developed. A jeep chassis was connected to a mobile science laboratory designed to meet the needs of field science, to help the teachers in their day to day programme. It also contained text materials, teachers' guides, science kits, resource materials, teacher training components, audio visual aids and sets of hand tools. This mobile lab was also found useful in training of teachers in rural and distant areas, spreading scientific literacy among rural adults and educating the rural community, enriching the primary teachers' knowledge and using it for in-service programme for teachers.

The Pilot Phase under SSTP started with 30 middle schools in Delhi in the year 1966-67 and was completed in 1968-69 in a period of 3 years. This pilot phase received technical assistance from UNESCO Mission and financial assistance from UNDP. The chief of UNESCO mission, India, and resident representative of UNDP personally and together with their staff rendered help.

The teachers of pilot schools (30 middle school teachers) were oriented in trying out the curriculum material developed in physics, chemistry, biology and mathematics and handling the equipment. Based on the feedback after the completion of the pilot phase, the materials were revised with the help of teachers in workshops and final versions of materials were then brought out. It was recognised that these materials would serve well as basis for further development in the restructuring of science education.

After the development of materials, the next step was its implementation in various states. India is a federal state with a union of 30 States/UTs. For this phase, assistance from UNICEF was available and the strategy was to involve the states that volunteer to take up the project.

Science Education Project (UNESCO-UNICEF assisted project) for all levels of education was initiated by the Union Ministry of Education in consultation with the State Government and other agencies in 1967.

4.4.4. SCIENCE EDUCATION PROJECT (SEP)

In 1964, UNICEF joined hands with UNESCO and with the Government of India in the task of shaping and financially supporting a mutually agreed plan of operation for "the re-organisation and expansion of the teaching of science to students throughout the school stage in India".

The agreed plan of operations was signed in April 1967 at New Delhi. P.N. Kirpal for the Ministry of Education, India, Raja Roy Singh, Regional Officer of Education, UNESCO, Bangkok, and Charles Egger, representing UNICEF, signed the agreement.

Its main aim was to reorganize and expand the teaching of science for as many students as possible during school stage, and "developing the scientific attitude and scientific literacy in the students". The main emphasis of the programme was "Learning by Doing", so that the students learned the how and why of things by a process of experimentation and enquiry. This discovery approach to science was based on experimentation, which required tools, gadgets and apparatus.

The specific objectives of the programme were to:

(1) Introduce of new curricula in primary and middle stages throughout the country in a phased programme,

(2) Supply laboratory equipment, workshop tools and library books to the teacher training institution called "Key Institution", in order to make them self contained for an improved training programme in preparing science teachers.

Recognising that the renewal of syllabus calls for retraining of teachers in content and pedagogy, re-orientation cum training courses as well as in-service courses for elementary, middle and secondary school teachers had been envisaged by the plan of operations.

Education in India is a state subject especially for nature and development of curriculum materials. So, the project had to be implemented throughout the country of 30 States/UTs. It involved 30 administrating entities, more than 50,0000 schools, 2,500,000 teachers and 87,000,000 students. To implement the project in such a vast number of institutions, the strategy adopted was to implement it through key institutions in the States/UTs, and to proceed in three phases.

After the initial development of instructional materials, the developed syllabi and instructional materials would be tried in a limited number of schools of each state in the first phase called the pilot phase. The implementation of the revised materials would be done after three years in an increased number of schools of each state, called wider expansion phase, which would precipitate the universalisation of the programme in its third phase, extending the programme to all the schools in the state.

The key institutions through which the programme had to be implemented were Primary Teacher Training Schools (PTTS), Secondary Teacher Training Colleges (STTC), State Institutes of Education (SIE), State Institutes of Science Education (SISE) and State Council of Education Research and Training (SCERT).

During the third five-year plan, a number of states had already set up SISEs and others added science wings to their SIEs and a few had established SCERTs. One or other of these bodies, assumed the responsibility, at the state level, for the implementation of the UNESCO-UNICEF aided project. These state units were strengthened for conducting in-service and orientation programmes for teachers, with laboratory facilities.

Implementation of the Project

Under this project the NCERT was required to:

(a) Provide instructional materials for the participating states to be used in the experimental schools.

(b) Organise orientation courses for key personnel from the key institutions.

(c) Manufacture sample kits of science equipment for use in experimental schools for the teaching of new science courses.

(d) Co-ordinate the supply of UNICEF equipment to the various key institutions in the states.

In the pilot phase, 79 key institutions and, in the wider phase, 500 key institutions were selected for a supply of imported laboratory equipment, workshop tools and library books in various states.

The 579 key institutions included SISEs (15), SIEs (17), STTCs (21), and PTTSs (426). The names of the key institutions were recommended by the state educational authorities and approved by NCERT after satisfying themselves that they fulfilled certain criteria of space, staff and curricular requirements in science.

The UNICEF equipment to be supplied consisted of library books, laboratory equipment and gift paper.

Library: Library materials contained books in the area of physics, chemistry, biology and pedagogy as also encyclopaedia.

Laboratory Equipment:

(a) Audio visual equipment.

(b) Light power tools/workshop science equipment.

(c) Hand tools/workshop teaching materials.

(d) Chemistry equipment.

(e) Additional Physics Equipment.

(f) Additional Biology Equipment.

(g) Physics-Basic Science Equipment.

(h) Chemistry-Basic Science Equipment.

(i) Common Basic Accessory Equipment for Physics, Chemistry and Biology laboratories.

(j) Microscopes for Biology Basic Science Equipment.

(k) Glassware for Physics, Chemistry and Biology Basic Equipment lists.

UNICEF Gift Paper: UNICEF supplied 9000 Metric Tones of gift paper for printing science textbooks, teachers' guides and kit guides for middle and primary schools.

Supply of Science Kits: In the pilot phase of the programme, the central science workshop and department of science education of NCERT developed the science kits provided to schools selected in the pilot phase, which were 50 primary and 30 middle schools in each State/ UT. In the wider introduction phase of the programme, the UNICEF selected few manufacturers of science equipment in India to supply science kits to the selected schools of the programme.

The supply of primary and middle school kits consisted of the following types:

(a) Primary science kit.
(b) Physics part I kit.
(c) Physics part II kit.
(d) Physics part III kit.
(e) Chemistry kit.
(f) Biology part I kit.
(g) Biology non composite kit.
(h) Biology composite kit.

Curriculum Development: The science department of NCERT under the UNESCO sponsored Secondary Science Teacher Training Programme and UNESCO-UNICEF sponsored Science Education Programme had already developed the new science curriculum, syllabi and text books for all the classes from Standard I-X, teachers' guides and supplementary reading materials for primary, middle and secondary classes.

The central workshop of NCERT, with the UNESCO experts, had developed demonstration kits, and physics, chemistry and biology kits for middle school classes and a special kit for primary classes. The Department of Science Education of NCERT had produced films, slides and brochures for effecting qualitative improvement in science education.

The central team, consisting of representatives of the Central Ministry of Education, the NCERT and the Planning Commission and UNICEF, finalised the plans in each state to launch the programme. The project started in the year 1969-70 in some of the states during the fourth five-year plan period, for a period of five years and to finish during the year 1973-74.

In the beginning of the school year of 1970, the pilot phase of the project was launched in 11 States and 2 Union Territories (UTs) and the participating states undertook to translate into its own regional language either the NCERT materials in their original form or a version of them, adapting to their local needs. These were supplied to the participating school free of cost. The states, which joined the pilot phase, were — Bihar, Gujarat, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Punjab, Rajasthan, Tamil Nadu, Tripura, Uttar Pradesh, Delhi and Pondicherry.

The re-orientation of teacher educators and the retraining of teachers were done along hierarchical lines, administered by NCERT. The Department of Science Education of NCERT, provided the leadership training for the science staff of the four Regional Colleges of Education while, in turn, they re-oriented the science educators of the SIEs, the SISEs and STTCs. The science educators then retrained the method masters of the Primary Teacher Training (PTTs) and science teachers of secondary schools, who retrained elementary and middle school teachers.

The states, which completed the pilot phase during 1973-1974, started implementing the programme on a wider basis, covering 9407 primary and 13512 middle schools. By the year 1977, the number of primary schools covered was 38572 and the teachers covered were 48197. The pilot phase of the scheme had been satisfactorily completed in almost all the States/UT's. The 11 States/5 UT's had even universalised the programme covering 88000 primary schools. The number of teachers trained was over 2,30,000.

By 1978, over 48,000 science kits were supplied. 75,000 primary school teachers, teacher educators, science supervisors and craft instructors were trained. Books, equipment and tools were supplied to over 8000 teacher training schools. Nearly 10 million primary school children were benefited.

The pilot phase and the wider expansion phase lasted together for 6 years.For the universalisation of the programme, there was no time limit as it was dependent upon the state funds and resources.

During the 5th plan period (1974-79), UNICEF assistance laid emphasis on the primary school stage and application of science to the children's living conditions. The assistance for the middle schools was phased out under the SEP project.

Financial Commitment

The project funds for the pilot phase were provided for the cost of transportation and printing of the trial editions of textbooks, teachers' guides and the in-service training of the teachers. Each school was supplied with a science kit. For the pilot phase, the supervision of the project was the responsibility of SISE of each state.

Based on the experience of the pilot phase, the states were assisted in implementing the scheme on a wider phase. The assistance then was limited to 5% of primary schools and 33% of middle schools. These schools were to use the revised materials from the pilot phase. Science kits were provided free but 50% of the cost of training the teachers was provided by the project funds. For the wider phase, district level science supervisors were expected to supervise. For the universalisation of the programme, the resources had to be provided by the state itself.

Sharing of Project Funding: Towards the project cost, the UNICEF provided the full cost of the supply of kits in the pilot phase and one half of the cost of the text materials and one half of the cost of retraining of the pilot phase teachers. The Government of India bore the cost of reorienting the key personnel of the pilot phase and one half of the cost of the supply of textual materials to the pilot schools and one half of the cost of retraining of teachers.

A supplement agreement between UNESCO/UNICEF and the Government of India was signed in April 1972 for a wider introduction phase, which covered:

(a) Supply of science laboratory equipment and selected library books to 500 key institutions.

(b) Supply of science kits to 24000 primary schools and 31000 middle schools in a phased manner.

(c) Training of 55000 teachers @ 1 teacher per school.

(d) Supply of supervisory vehicles @ 1 per state.

(e) Supply of mobile laboratory vans @ 1 per state.

(f) Limited supply of paper for printing the new instructional material.

UNICEF undertook to supply 50% of the laboratory equipment of training institutions and reimbursed half the cost of 300 science educators. The total cost of the supply made by UNICEF in both the phases is Rs.123 lakhs.

Limitations of the Project were:

(a) Universal adoption of materials raised problems of in-service training on a gigantic scale, since the supply of kits and other curricular materials in large quantities posed a problem.

(b) The attitude of teachers in bringing about the educational change in the classroom was a vital bottleneck in the programme.

(c) Some state units of science education lacked accommodation facilities for storing the equipment supplied by the project. Also, there was an absence of adequate capability of the personnel in handling the apparatus, specially the sophisticated ones.

(d) The Centre for Development Overseas (CEDO) observed that, in SIES, although there existed laboratories, no time was allotted in the programme for the lab work.

(e) There were fourteen official languages in India and, since primary education in the states had to be conducted through the regional languages, the preparation of instruction materials in all the fourteen languages delayed the programme of implementation.

(f) There were financial problems even in the pilot phase with limited target.

(g) There was time lag in many stages of the programme: training of teachers, printing and supplying of books and supply of kits. This did affect the impact of the project on the desired objectives.

(h) Since the pre-service training of elementary teachers did not produce sufficient expertise in science teaching, improvement in training programme for primary teachers was needed.

(i) The teacher training schools of elementary teachers needed proper facilities in terms of laboratory equipment and the right type of training methodology of science teaching.

Evaluation of Project

The Central Government appointed a senior officer with a special administrative office to help him in his day to day responsibility. This officer collaborated with the UNESCO in defining the criteria for developing the evaluation of the project.

The Centre for Educational Development Overseas (CEDO) was invited by UNICEF in the year March 1971 to undertake an assessment of UNESCO-UNICEF assisted SSST project, which was just then started in thirteen states in the year 1969-70, in order to make future allocations of money during the period 1971-1974. The team made visits to all the states and visited some schools, which had joined the pilot project.

Some of the findings were:

(a) The science teachers who were trained to take up the pilot projects were mostly high schools graduates with one or two years of primary teacher training. Some of them had not even studied science subjects in their higher secondary schools and were not accustomed to handling science apparatus before they were retrained. After their training, they had created a worthy environment of science in the class. They could handle the apparatus very well, improvised the apparatus, developed science charts, used scientific methods and encouraged individual experimental work by duplicating the apparatus in sufficient quantity.

(b) The CEDO team had a special appreciation for the progress made in Rajasthan as the retraining of the teachers was most effective due to their professional relationship between the school and the NCERT.

(c) Quoting from the record, "... the team wishes to record its gratitude to the children they encountered in the many schools they visited, whose unsimulated and, therefore genuine interest in and enjoyment of their science lessons testified more eloquently than could any words to the education benefits which are already flowing from the project and from the efforts which have, so far, been put into realising its aims."[34]

(d) The team visiting a retraining course at SISE of the state of Haryana was very appreciative of the excellent rapport between the two lecturers from NCERT who were retraining the teachers and the trainees of the school. The two lecturers of the NCERT were very good in their job. Their relationship with the teachers was excellent. The enthusiasm of teachers was so great that it could not go without mention.

Recommendations of CEDO

The following recommendations of the CEDO team are of great significance in developing any future science project.

(a) The CEDO recommended full time appointment of an official to take the responsibility of the ministry's role in the project. He should be chosen for his ability to carry the necessary weight-in, on the spot discussions with the state secretaries of education having both professional knowledge and administrative acumen.

(b) The objectives of the project and the Government's present intentions should be clearly communicated to the states and lateral lines of communication be maintained between states, and between the centre and the states.

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[34] The Center for Educational Development Oversees, Travistock Square, London WCI, *Science Education in India, An Assessment of the UNICEF aided Project on Science teaaching at the School stage.* Main Reposrt, Vol. 1 - 4 (Mimeographed)

(c) Schools should know the objective of the project, which they have taken up.

(d) Model instructional materials for pre-service training in Primary Teacher Training Schools (PTTS) and Secondary Teacher Training Colleges (STTC), model syllabi for orientation at state level, method masters from PTTS and model syllabi for the retraining of primary, middle and secondary school teachers are required for the phased development of the project.

(e) Quality control is essential, if the project is to be effective. Thorough retraining of all the teachers in the wider phase of the project is necessary as was done in the pilot phase.

(f) The retraining of teachers should preferably be for eight weeks.

(g) The wider introduction of the project should follow only after the implementation of the pilot phase of three years. There cannot be a compromise on it.

(h) The staffing of the four Regional Colleges of Education should be strengthened and these colleges should be closely involved in the project.

(i) The science staff of SIEs & SISEs should be trained and the curriculum of teacher training colleges be revised and practical work be included for the training of teachers.

Success of the Programme: In spite of many limitations in the implementation of the programme during its universalisation phase, the following aspects contributed to the success of the programme.

(a) There was active collaboration of curriculum makers, scientists, research workers and teachers in the development of climate for improving the quality of science education in school.

(b) Uniformity of the science content in the primary and middle schools throughout India was achieved in developing the content of science, based on the basic concepts of science, related to everyday life.

(c) The content was interesting to the child, making it activity based.

(d) State level leadership had been developed, which was very important in a vast country like India.

(e) There was a catalytic effect of the pilot phase and the wider phase in universalising the programme by many of the states in all primary and middle schools.

(f) Apart from the schools run by State Government, many schools in the private sector and central schools, sainik schools, encouraged the development of science education in their schools as well.

4.4.5 PROJECT NUTRITION, HEALTH EDUCATION AND ENVIRONMENTAL SANITATION (NHEES)[35]

Malnutrition among poor children posed a serious health problem in India. It was widely prevalent among poor children and expectant and lactating mothers. According to the nutritional statistics, nearly 42% of the total population in the age group of 0-14 years were the victims of malnutrition.

Low purchasing power of people due to poverty, non-availability of nutritional food, the lack of proper knowledge about nutritional food to a large extent, false and wrong beliefs and practices related to health environmental sanitation formed the important factors.

Education was the best and only means to eradicate the ignorance and false beliefs and to provide proper knowledge of health, nutrition and sanitation and develop skills in them for healthy practices. Such an education should start in primary school itself, to catch them when they are young and get them into healthy habits. This needed the reorganisation of the primary curriculum incorporating Population, Health, Environment and Sanitation concepts and training teachers to.

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[35] Based on: Shukla Bhattacharya, Nov. 1991, *An impact study project. Health Education and Environmental Sanitation.* Editor Praful Dave, A UNICEF assited Project NCCERT.

impart that knowledge to the children. This education had to reach nearly 5 lakh existing primary schools and 14 lakhs teachers throughout the country, which was a gigantic task.

In the year 1971, Sri Avinashalingam Home Science College, Coimbatore, Tamil Nadu, took up a pilot scheme of introducing Nutrition Education in the Primary Schools in the State of Tamil Nadu and approached UNICEF for financial help through the state and national governments. The department of science and mathematics of NCERT, which was reorganising the program of science education at all levels of education, caught on to the idea of developing this scheme at the national level. Thus the project, Nutrition, Health Education and Environmental Sanitation took its birth.

During the fifth five-year plan (1974-78), elementary education was given a prime place in the scheme of educational planning in the country. To support the Government of India's Educational Programmes, a Master Plan of Operation (MPO) was prepared and agreed upon by UNICEF and the Govt. of India.

Among the educational programmes to be undertaken as per the MPO, was the continuation of the Science Education Project (SEP) which was initiated earlier under the programme of science education.

The specific objectives as stated in MPO were:

(a) To complete the preparation of the primary school science curriculum materials with expansion to include health, environmental sanitation, nutrition and child care as part of curriculum.

(b) To determine the effectiveness of the Science Education Programme (SEP), so that the teaching of science can be improved. Such an assessment will also provide information for use in curriculum renewal efforts and contribute to effective education programme (UNICEF-GOI, 1974, P304).

The project NHEES was undertaken in the context of Universalisation of Elementary Education (UEE) in the year 1985. In order to check the dropout rates of rural children, especially from the elementary schools, one of the problems in achieving the UEE was to develop need-based, decentralised curriculum process and content. It also sought to provide children with skills to fight disabling childhood diseases, provide knowledge of nutrition and sanitation, develop attitude to practise right habits which improve their quality of life and make them both users and transmitters of health information. The need of this project arose due to the dismal sanitary conditions and health status of the children especially in the rural side, in spite of the development of curative medicine and medical facility.

The project was addressed to educate both students of primary school and the community, since the community's co-operation was of prime importance in achieving the desired result with the students.

The main aim of the project was to solve the problems of nutrition, health and environmental sanitation existing in the community by the intervention of the project in the school and community in selected areas in the participating States/UTS.

Implementation of the Project

The project was implemented in two phases, covering a period of 15 years. The pilot phase was implemented in five regional centres during 1975-80, and the expansion phase covered the period of 1981-89. The intervention programmes of the project was addressed to primary school children and also to the adults in the community at large.

The objectives of the (Pilot Phase) of the project were:

(a) To develop a curriculum package and a methodology that would develop knowledge, habits, practice, skills and attitudes in the area of science learning for primary school children,

(b) To introduce the programme to the community through teachers and students to develop in them: (i) Knowledge of nutrition; (ii) Proper methods of preparation of food; (iii) Conservation of food; (iv) Desirable habits (both general and personal).

The strategies of implementation were:

(a) Establishment of nutrition centres.

(b) Selection of a block of predominantly backward area.

(c) Conducting of survey of the project area and location of the problems related to the area of health, nutrition and sanitation habits.

(d) Development of relevant instructional materials for students, teachers and teacher educators.

(e) Trying out the materials in 100 selected primary schools.

(f) Dissemination of the UNICEF message to the community with the help of teachers and students in selected villages.

During 1975, to implement the scheme, five Regional Centres, one for each of Southern, Eastern, Western, Northern and Central parts of the country were established. This was done with the intention of taking care of the diversities of conditions, food habits, etc. of each region. The department of science education of NCERT was acting as their nodal agency.

The following are the Institutions where Regional Nutrition Centers (RNCs) were located:

	Location	**Region**
(1)	Sri Avanishalingam Home Science College, Coimbatore, Tamil Nadu	Southern
(2)	Biharilal College of Home & Social Science, Calcutta, West Bengal	Eastern
(3)	Department of Food and Nutrition Facility of Home Science, M.S. University, Baroda, Gujarath.	Western
(4)	College of Home Science Punjab Agricultural University, Ludhiana, Punjab.	Northern
(5)	State Institute of Science Education, Jabalpur, Madhya Pradesh	Central

In August 1975, a three day National Conference of experts in the field of Nutrition, Health, Sanitation and Elementary Education was held at Sri Avinashilingam, Home Science College, Coimbatore, at the instance of the Government of India, UNICEF and Department of Science Education NCERT. All the Honorary Directors of Regional Centers, Members of NCERT and UNICEF were present. The conference worked out the general strategy and guidelines of implementation.

According to the scheme worked out in the conference, one rural district of the state would be the operational centre for each regional centre. This rural district would involve 100 selected primary schools. The state government would actively associate itself with the project. The teacher training institutions located in the area would be centres of training of teachers and for other associated work.

Each regional centre would develop the package of instructional/ learning materials, which would be gradually introduced in all the training colleges and primary schools of the states in which the Regional Centres are located, and later introduced in the entire country.

The agencies, which were involved were the Ministry of Education, UNICEF, NCERT and Regional Nutritional Centres. The Ministry of Education supervised and managed the project, UNICEF gave the technical guidance for planning and financial assistance, NCERT gave the academic help and the Directors of Regional Centres were responsible for proper planning and implementation of the project in their respective states.

Development of Curriculum Materials

Before the RNCs embarked on the production of curriculum materials, a new attempt was made to produce "Curriculum Guide on Nutrition, Health Education and Environmental Sanitation in Primary School", within the framework of the National Curriculum for the ten year school.

This was developed in a workshop held at Baroda in January 1976 to serve the five RNCs of the pilot phase. The curriculum guide is a very comprehensive document and deals with every aspect of the curriculum in detail, such as:

(a) Objectives of the pilot scheme.

(b) Expected outcomes.

(c) Contents of the science syllabus.

(d) Curriculum elements of nutrition, health education and environmental sanitation.

(e) Programme objectives.

(f) Instructional objectives — classified under three types of objectives namely cognitive, affective and psychomotor.

(g) Contents and organisation: contents expressed as a series of major ideas classwise from I-V (minor ideas under each major ones).

(h) Nutrition/Health education and environmental sanitation as a part of environmental studies for Classes I & II which develops around seven themes namely our family, our home, our school, our neighbourhood, our earth, our sky and stories.

(i) Teaching strategies.

(j) Giving actual experience, motivating, teaching modified to readiness of the learner, integrated approach of environmental studies, developing the power of observation, activity learning method, developing scientific process of observing, classifying, experimenting, inferring, interpreting, communicating and defining, space time relations, measuring and using numbers.

(k) Activities in relation to nutrition education evaluation - both performance and summative of testing knowledge, understanding, application and skills.

(l) Sample of test items.

(m) Guidelines to the teachers in arranging activities as per classwise organisation of content matter into major and minor ideas.

(n) Model test items.

(o) Model lesson plans for all the classes with teacher pupil activities and learning outcome.

(p) A "Design of teacher training programme' of five days duration for orienting the teachers regarding:

  (i) The objectives of nutrition and health education and environmental sanitation;

  (ii) Content matter with additional information;

(iii) Methodology and teaching aids;
(iv) Evaluation procedure;
(v) Planning of lessons;
(vi) Guidelines to resource persons.

The resource persons should so design tthe course, that it incorporates.

(i) the essential principles of nutrition education with ample examples of locally available food habits and practices.
(ii) local health and environmental sanitation situations.

Though the guide had been developed to cater to the immediate need of the regional centres and future needs of various states/UTS which were going to take up the project, it was found very useful even for: (a) curriculum planners and evaluators, (b) text book writers, (c) teacher educators and supervisors and (d) class room teachers.

The Department of Education in Science and Mathematics (DESM), NCERT, developed the "Revised Primary Science Syllabus" from the materials produced in :

(a) Workshop held in DESM from February 25 to March 4, 1974.
(b) The National Seminar on Nutrition Education at Jadavpur, 15-24 October 1974.
(c) The Health Education Syllabus for Ages 6-11, Central Health Education Bureau (CHEB).
(d) Suggestions of the working group on Health and Population Education.

The overall contents of the syllabus were:

Unit I : Our Universe,
Unit II : Air, Water and Weather,
Unit III : Rocks, Soils and Minerals,
Unit IV : Force, Work and Energy,
Unit V : Materials and Its Properties,
Unit VI : Housing and Clothing,

Unit VII : Living Things,

Unit VIII : Human Body, Nutrition and Health.

The last unit included the components of nutrition and health education and environmental sanitation. The contents were arranged classwise I to V, under two columns, major and minor ideas.

Using the guidelines provided, the RNCs conducted two base line surveys by preparing questionnaires directed towards (1) elementary school teachers, (2) parents of elementary school children, to find out the local conditions prevalent in the areas of nutrition, health, education and environmental sanitation, practices and habits. This became the basis for producing the curriculum package and instructional materials by each RNC. The curriculum package contained syllabi and reading materials for pupils of Standard I to V, reading materials in the form of manuals to teachers and teacher educators, syllabi for primary teacher training institutions and teachers' guides, text books forClasses I to V and evaluation tools. These packages were tried out in selected project schools.

Scheme of Implementation

The following steps were followed in introducing the curriculum into the schools:

(a) Orienting the teacher educators.

(b) Training of teachers.

(c) Trying out instructional materials prepared.

(d) Supervising the transaction of evaluation of the instructional materials.

(e) Revising the curricular messages to suit the conditions.

Evaluation

During the pilot phase, 118 educators/supervisors, 7091 teachers and 2308 schools were involved from all five RNCs.

The evaluation of the pilot phase was conducted to find out—

(1) Appropriateness and effectiveness of the materials in delivering the messages.

(2) The impact of materials and methods on pupils, teachers and teacher educators.

The important findings of the evaluation were very encouraging:

— There was an impressive improvement in school lunch programmes.

— The health status of children improved.

— The nutritional and environmental practices were markedly improved.

— Messages related to nutrition, health and environmental sanitation had a carry- home effect.

— Teachers were enthusiastic about the project.

Before the commencement of the Expansion Phase of the project, an objective in-depth evaluation of the project was conducted by the Nutrition Foundation of India, during the year 1981-83.

The major recommendations were:

(a) The content and strategies adopted for the community contact programme need modifications.

(b) The departments of preventive and social medicine, the departments of food and nutrition of home science colleges should be enlisted to write a series of lessons on health education, environmental sanitation and nutrition, based on the syllabus, to be incorporated in the text books.

(c) The central and state health education bureau should develop appropriate teaching aids relevant to the rural situation, with the help of NCERT.

(d) The community contact programme of the project should enlist the help of other rural developing agencies.

Based on these recommendations and also guided by their experience in implementing the pilot project, necessary modifications were made in the project in the expansion phase.

Expansion Phase

In this phase, the project was introduced in ten more States/UTs namely, Andhra Pradesh, Assam, Bihar, Haryana, Karnataka, Maharashtra, Mizoram, Rajasthan, Orissa and Uttar Pradesh, during 1981-84.

During the expansion phase, the community contact programme, which was specifically aimed at adults in the community for changing their behaviour and also reinforcing that of children during the transaction of the special curriculum in the project schools, assumed a bigger role. The community contact programme was executed in 25% of the selected villages under the project in each state.

The following messages were conveyed to young mothers and women by the teachers who were involved in the NHEES project by door to door contact, monthly meetings with the members of the community and by organising exhibitions and fairs.

The messages were:

(a) Continue breast feeding as long as possible.

(b) Avoid bottle-feeding.

(c) Add supplementary food from the age of four months onwards.

(d) Immunize your child before the first year as early as possible.

(e) Include in the daily diet of your child a variety of available foods in adequate amount, distributing them among three regular meals.

(f) Use safe water for cooking and drinking.

(g) Use drainage water for raising food plants and make provision for a Soak Pit.

(h) Provide sanitary facilities in the school and in the community. Do not urinate, defecate or spit anywhere but at the place provided.

(i) Keep your school, home and village surroundings clean. Make provision for Compost-Pit.

(j) Do not pollute sources of water.

(k) Keep your body clean, pay special attention to nails and teeth.

The strategies of implementation were:

(a) Establishment of Nutrition Centres in home science colleges or in viable institutions.

(b) Selection of a backward area or tribal area for implementation of the project.

(c) Selection of 100 primary schools in the area.

(d) Conducting a survey of the project area to find out the nutrition, health and sanitation habits and revise the work already done by the RNCs.

(e) Analyze the existing curricula to identify the components of health, nutrition and sanitation education.

(f) Development of relevant instructional materials for pupils, teachers and teacher educators.

(g) Testing and trying out the materials in the school.

(h) Introducing important messages of NHEES to the community with the help of students and teachers.

During the high level meeting of all the Education Secretaries, Directors of Education/Public Instruction, Directors of SCERTs/ SIEs/ SISEs, officers of MOE, the NCERT, the UNICEF, NIEPA in the four regions at the end of the master plan of operations (1980-84), it was decided to discontinue the project at Baroda, Jabalpur and Ludhiana, whereas the project at Calcutta did not take off at all. The concerned states did not take any action for wider diffusion, integration of the curriculum, syllabus and instructional materials developed under the project into the existing primary school curriculum and also there was non-performance in terms of attainment of targets envisaged in the plan. Also the Percentage Utilisation Rate (PUR) of funds was very low for the years 1980,1981,1982, 1983 & 1984.

The main conditions stipulated for continuation of the project were:

(a) Wider adoption of concept evolved and techniques developed in the curriculum and instructional matters for NHEES into the existing system of primary education.

(b) To link project NHEES and the materials developed to be integrated with those of Primary Education Curriculum Renewal (PECR), a long term activity of education reform in India supported by UNICEF which was agreed upon in the master plan of operation, 1974-79.

(c) Modification of the curriculum of elementary teacher training institutions to include the concepts involved and techniques developed under NHEES project.

(d) Provision of budget to train all the existing teachers in in-service programmes in the new syllabus, both at school and teacher training institutes.

During the period 1985-89, Andhra Pradesh, Bihar, Karnataka, Madhya Pradesh, Maharashtra, Mizoram, Orissa, Tamil Nadu, Rajasthan and U.P were allowed to continue.

Impact of the Project

Planning and implementing an innovative programme in education normally takes a long time. By the time the impact of the project is finally assessed, most of the results accrued become things of the past and will not be of much value for future planning and development of educational processes. Therefore, in this project, a built-in system was designed to evaluate periodically the planning, implementation process, effectiveness of curriculum materials and methods and also achievement of pupils in respect of knowledge, understanding and application skills in relevant areas.

During the year 1987-88, two research studies were undertaken to find the impact of the project. The findings of the two research studies i.e "Study of Pupil Achievement" and "Study of Impact of Community Programme" were :

(a) The implementation of the programmes was tardy and uneven.

(b) Central agencies, state agencies, home science colleges and universities were not able to adequately utilise or absorb funds provided liberally by UNICEF.

(c) The problems of administration and management overwhelmed the process of implementation.

In spite of these bottlenecks, positive behavioural changes accrued in the children and community as under:

(a) Measurement of achievement was more complex than what it was thought to be.

(b) Achievement did not depend upon the sex.

(c) The socio-economic variables such as rural/urban, social status, income of the parents, parents education, fathers' occupation and mothers' occupation had significant relation to the child's knowledge, understanding, application and skill. However, the magnitude of the relationship was not very significant.

(d) The high level achievement of pupils in Class I and Class II decreased gradually in Classes III, IV & V.

(e) The achievement of a child in respect of knowledge, application and skill seemed to be influenced more by the school environment than the home environment.

(f) The overall evidence strongly indicated that the impact of the project intervention was significantly positive in enhancing the achievement levels of pupils in knowledge, understanding and application of skills.

(g) The unique feature of the project is its intervention in the community, which assumed an important role in bringing about the desirable change in NHEES in the project areas.

The overall data indicated that the impact of the community contact programme was extremely positive since:

(a) The pupils of project schools performed better than the pupils of non-project schools.

(b) The pupils of project schools + community contact project fared better than the pupils of the non-project schools.

The pupils of project schools + community contact project sometimes fared better than the pupils of the project schools.

The delivery of ten UNICEF messages as a consequence of intervention of the community contact programme, made a positive impact on the community in changing their attitudes as desired by the messages indicated earlier.

4.4.6 IMPROVED SCIENCE EDUCATION IN PRIMARY AND MIDDLE SCHOOLS IN MADHYA PRADESH AND UTTAR PRADESH[36]

Indo-German Project: (NCERT-GTZ) known as Environmental Studies — Science at the Primary Stage, is one of the technical co-operation projects between the Republic of Germany and the Republic of India, which aims to help improve science teaching by developing teaching materials, producing them and supplying schools.

The executing agency for Germany was GTZ (Deutsche, Geselleshaft, Fir Techinische Zu Sammenar-beit) and for India was NCERT on behalf of Ministry of Human Resources Development, SCERT and SIES for Uttar Pradesh (U.P) Government and Directorate of Instruction of Madhya Pradesh (M.P) Government.

The project "Improved Science Education in Utter Pradesh and Madhya Pradesh" was an effort made by the Government of India to achieve the objectives called for in the National Policy, 1986. The National Policy, 1986, calls for learner centred and activity based approach for exploring environment at the primary stage. Activity approach motivates and creates interest in the learner to explore his environment. The experience of "doing" makes his learning more effective. It develops thinking and reasoning, which will lead the learner to problem solving. This makes the person self-reliant and self-confident and induces him to do innovation. The activity of "doing" makes education a joyful, inventive and satisfying experience. The rationale and the attitudes that have developed in him will be useful in solving real problems later in his life, which is one of the objectives of learning of science.

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[36] Based on: Sylvia Mlynek, Indo-German Project (NCERT-GTZ), 1984, *Improved Science Education in Primary and Middle Schools in Madhya Pradesh and Uttar Pradesh*, Environmental Studies at the Primary Stage, Published GTZ, E. Scharin (FRG).

The project's appraisal report was prepared in 1984 and was designed according to the needs of two states, U.P. and M.P. In the early 1986, a plan of operation was worked out, agreeable to the Government of India and the Federal Republic of Germany. The two states U.P and M.P., compared to 70% literacy in Kerala at the time selected were most populous and educationally backward with the literacy rate being only 35%. This project was undertaken as a measure to improve science education in primary and middle schools in the two states.

The Education Consultant and General Leader Mr. V.Weisser started developing teaching learning materials soon after the agreement. Two other consultants joined him later. The project was started in 1986 with the formation of technical groups at NCERT, academic teams in the states of U.P. and M.P and NCERT. An objective-oriented project-planning seminar (ZOPP), attended by the representatives of the teaching profession and the technical planning staff, was held in Gwalior in Nov 1986. These consultants with the academic team of NCERT decided to conduct a survey in both the states to get the information about the existing system of teaching science, so that a realistic view and appropriate action could be taken in designing and implementing the project. With the aim of promoting experimental science teaching in middle and primary schools in the two states, the following activities were envisaged as its first plan of operation:

(a) Development of an improved type of Primary Science Kit (PSK).

(b) Setting up facilities for large-scale production of the kit.

(c) Development of Teachers' Hand Book (THB) for science teaching and a kit manual.

(d) Dissemination of these materials.

(e) Planning and conducting in-service training courses for teachers in order to familiarize them with the kit and generally promote experimental teaching methods.

In order that the science equipment created would be appropriate in terms of cost, production facilities, educational objectives of the curriculum of the state, financial resources available and the technological level of the country, they had to be custom made, as imitative models from other developed countries or the commercial models might not be suitable.

In its second plan of operation, a status survey was carried out in 252 primary schools in 23 districts of M.P. and U.P by a short term German project team with the help of NCERT staff and brought out two studies:

(a) The present situation of science teaching in schools in M.P. and U.P.

(b) The present situation of science teacher education in M.P. and U.P.

The survey provided the project with background information about the way science was actually taught in the schools. This information was used as a basis for projects and further activities, particularly in the in-service courses, according to the needs of the schools and the teachers.

The following were their findings: (a) Students started learning science as a part of environmental studies in the third year of primary school and it formed only 15% of the timetable in the lower primary level and 12% of science education in the upper primary level; (b) The teaching situation in schools was bad, specially in rural areas; (c) The schools did not have even one science room for all sections; (d) The class rooms lacked even blackboards and teaching equipment; (e) The school did not have any facility to conduct experiments; (f) Text books were the only available materials for teaching science; (g) The method used to teach science, by the majority of teachers, was to make children read, para by para, from their text book and to use lecture method, or / and discussion method; (h) Even most of the trained teachers lacked confidence to teach science; (i) Headmasters and teachers valued experimental and learner-centred teaching methods and wanted improvements in teaching of science; (j) Many were interested in science programmes offering training in experimental teaching and the use of teaching aids to go with it; and (k) The majority wanted teachers' hand books to go with the experiments and science kits.

Production of Materials

As a first step, the academic team analysed the existing curriculum framework guidelines, syllabus and other teaching —learning materials developed at the NCERT on environmental science in both the states of M.P. and U.P.

Thereafter, learning outcomes, teaching methods, contents and materials were developed. The technical team developed the first prototype of the Primary Science Kit (PSK). The pedagogical team, in parallel to the PSK, drafted the Teachers' HandBook (THB).

Both the groups kept constant interaction in developing the material. The THB and PSK were tried out first in simulated conditions and also in primary schools of M.P, U.P. and Delhi.The finalised draft manuscript was sent to all academicians concerned in the project and also to some organisations and institutions working in the field. The results of try-out and the feedback received were discussed and the final version was incorporated in the THB. In the development of the project, teachers representing both urban and rural schools, both science and non-science backgrounds participated.

The highlight of this project was its close co-operation of the target group (science teachers), and technical and pedagogical groups, which was the first of its kind in India's experience.

Primary Science Kit

It is a kind of portable laboratory consisting of a box measuring 51 × 27 × 36 cm and weighs about 11.5 Kg. The kit can be used to perform more than 350 experiments and provide facilities for weighing, heating, measuring, etc. The box top serves as a table for conducting experiments and also demonstrations. There are 91 items in the kit, which are blistered packed in three plastic trays, which can easily slide into the box. The kit comprises a set of hand lenses, magnetic compass, lever beam balance, a multipurpose pump, a hammer and a small mould making candles and chalk and consumable items like fertilizers and chemicals. In short, the kit provides all the basic items needed for experiments, which are not available locally. Some items in the kit have multiple utility.

The kit goes with a manual which lists all the tools which are provided in the box, also a list of activities which can be performed for the three classes III, IV & V in accordance with the three volumes of the Teacher's HandBook.

Teachers HandBook (THB)

The Teachers HandBooks were prepared for Class III, IV & V. The THB was designed on the principle of activity based learning. It is useful for: (a) Teacher Educators, (b) in-service and pre-service training of primary teachers and (c) in helping the teacher in his role as a facilitator, a co-investigator and a co-learner.

The following are the contents of THB:

(a) General instructions in using the handbook.

(b) Science learning approach.

(c) Use of locally available materials.

(d) Detailed instructions to the primary teachers on the learner centred activities in the form of separate units based in the environment studies syllabus.

(e) Description of the activities which can be performed using the science kit, activities which can be performed without the science kit, using the locally available materials based on the learners' experience.

(f) Learning outcomes, suggested teaching steps and media/ materials needed.

(g) List of locally available scraps, low cost materials or no-cost materials.

(h) Suggested activities such as project work, group work, field work, collecting, sketching etc.

(i) Illustrations.

The handbooks have been developed both in Hindi and English.

Teacher Training

In order to acquaint the teachers with their new roles in a learner centred activity method, the Indian and international experts emphasised the importance of two instructional skills: (a) how to motivate the students to formulate questions and (b) how to guide them in their investigations and observations.

The training strategies used were:

(a) To train the vast number of primary school teachers in the shortest possible time in M.P. and U.P., the hierarchical training method was used.

  (i) Experienced teacher educators who were involved in the project were selected and trained as Key Resource Persons (KRP).

  (ii) Key Resource Persons trained experienced educators from teacher training institutions as Resource Persons (RP).

  (iii) These Resource Persons trained selected teachers from the various rural and urban schools of M.P. and U.P.

  (iv) The trained teachers, after gaining some experience, acted as resource persons in training other teachers.

(b) There were workshops conducted during 1987-88 for development of experimental editions ofTeacher's Hand Books for Class III, IV and V based on the new curriculum of environmental studies.

(c) The activity-based materials for the Teacher's HandBook were developed using every day experience and real life situations as perceived by the learners.

(d) The workshop department conducted a training programme for 10 KRPs for planning training packages including try out of the Teachers' HandBook and proto-type kit for 6 days, in 1985. This was done as a preparation for conducting the teacher-training programme in 1988-89. A first group of 60 Resource Persons underwent training in April 1989 at SISE, Allahabad for 10 days. By June 1989, 230 selected primary teachers had been trained at 5 District Institutions of Education and Training in U.P. in a ten-day programme. Between February 1990 to December 1990, 35 KPR, 24 RP and 544 primary school teachers were trained.

(e) The workshop department undertook the training of its own technical staff with a view to updating production technology.

Development of Kit and Production

The primary science kits were put to trial in 60 primary schools, both rural and urban, at Allahabad, Lucknow, Bhopal and Delhi, after conducting an orientation course for the teachers of those schools. The kits were used for three weeks in those schools. Kits proved to be successful. Later evaluation showed that the orientation programme, new teaching materials and the primary kits made the whole process of learning science a joyful experience for the teachers and students. The trial helped to modify the kits to suit the needs of the teachers.

For the main production of science kits, the workshops Vigyan Kit Nirmanashala at Allahabad, Science Kit Workshop at Bhopal and the Workshop Department at NCERT were equipped with necessary machines and moulds. These were provided by the FRG but had been purchased on the Indian Market to ensure supply of spare parts and maintenance, without causing a problem. The important items were produced at the workshops but the sample items were purchased from small-scale enterprisers in M.P. and U.P. & Delhi and were tested for their suitability. The Indo-Danish Tool room at Delhi and the Indo-German Tool room at Lucknow helped the small-scale entrepreneurs with the moulds, dies, etc., which they required to manufacture simple items. The workshops produced high quality, precise and accurate items at a minimum cost.

To upgrade the technology and the technical skills, two of the general managers of NCERT, Delhi, were sent for 15 months to FRG, during 1985-1986. Soon after their return, a technical training programme was arranged for the workshop staff and a six-week orientation training course in plastic processing was held in 1989.

Wider Application of NCERT-GTZ Project

Under the National Policy of Education, 1986 (NPE-1986) provision of access to education is one of the essential components of the programme of universalisation of elementary education.

In order to retain the children in the school and to improve the quality of education, there is a need for providing essential facilities (material facilities and learning equipment) to each and every school in the country. Therefore, NPE 1986 decided to undertake "A phased drive' symbolically called "OPERATION BLACKBOARD" (OB) to improve primary schools all over the country.

To improve the school environment with good buildings with facilities to retain the children, a nation-wide school programme "OPERATION BLACKBOARD" (OB) was designed with improved facilities.

In the year 1988, 86.5% children attended 528 thousand primary schools throughout India. Still a large percentage of the Indian children had no access to school. Among the existing schools, many schools had either no building or broken buildings without proper facilities and sanitation and run by a single teacher.

The Programme of Mass Orientation of School Teachers (PMOST) had been organised every year since 1986 by NCERT, to orient both primary school and secondary school teachers in NPE-86 with the help of SCERTs / SIEs in conducting the programmes in the states. The 1990 PMOST training cycle was converted to PMOST - OB at primary school level. Since science, technology and environmental science form the core subject at the primary school level and have an important role to play; primary science kits formed one of the minimum essential facilities. At the PMOST-OB training, the teachers were trained in using the primary science kit.

During 1990-91, 2151 primary science kits were produced and dispatched to the states. 9 sets of "OB" kits, each consisting of primary science kit, the Mini Tools kit and the Mathematics kit was dispatched to the DIETs at Delhi, Assam, Andhra Pradesh, M.P, U.P., Jammu & Kashmir, Tamil Nadu and Arunachal Pradesh.

Impact of the Programme

(a) The orientation programme, new teacching materials and the primary kits made the whole process of learning science, a joyful experiencce to both teachers and students.

(b) Experience was gained in the production of low-cost, durable science kits for the use of primary schools, especially in the rural areas, which lack the facility of laboratory.

(c) Technicians in the workshop of NCERT were exposed to improved production technology, with interaction of technically trained people of Germany.

(d) Science kits were improvised to suit the teaching of integrated science.

(e) Knowledge in advanced plastic technology was gained.

(f) There was increase in capabilities of the state workshops in M.P. and U.P. in producing the science kits, after having installed necessary machine in proper buildings.

(g) Appropriate technology for producing high quality design at the lowest possible cost was developed.

(h) The purchase of the machinery and equipment provided by the Federal Republic of Germany to the Indian market ensured the maintenance and spare parts supply without any problem.

(i) There was encouragement to small-scale entrepreneurs in producing simple items required in the science kit and an ensured market for those items.

(j) The NCERT workshop now plays an important role and provides leadership in India in handling different plastics, operating the injection molding machines, fixing and adjusting the injection moulds and other related skills.

(k) The capability of the NCERT technicians has guaranteed sustainability.

4.4.7. EDUCATIONAL TECHNOLOGY (ET) IN TEACHING OF SCIENCE

The importance of audio visual media was recognised and advocated in the school education by the Government of India in all its five year plans and also by setting up the National Institute of Audio Visual Education in the year 1959 at New Delhi. It trained many leaders at the state level, produced films and film strips and provided extension services of curriculum and distribution of audio visual materials and literatures. It was merged with the National Council of Education and Research in the year 1961 and it was renamed as Department of Teaching Aids (DTA) of NCERT.

In 1972, the Centre for Educational Technology (CET) was established, supported by a joint UNDP-UNESCO Mission in the form of equipment, experts and fellowships. " The UNDP assistance was to the tune of $1,137,267. India's contribution was Rs. 11,976,000.[37]

India took part in two important meetings on Educational Technology, which were held at Bangkok and Tokyo in the year 1973. The Bangkok meeting was organised by the Asian Programme for Educational Innovations and Development (APIED), in November 1973. The Tokyo seminar was on "Application of Educational Technology", arranged by the Japanese National Commission for UNESCO during Nov/Dec 1973.

The CET has trained a large number of training college teachers, key persons of AV Units in states, school teachers and others who are interested in the field of educational technology and in science education, during last three decades. All states have their own educational technology units, well equipped with audio-visual hardware.

The Centre of Educational Technology is actively involved in the production of educational materials and Multi Media package for the Satellite Instructional Television Experiment (SITE). The Government of India for a period of one year in collaboration with the Government of U.S.A launched the programme SITE in May 1975. The science programme comprising a total transmission time of 90 minutes was broadcast to children of age group 5-12 years. The programme telecast was used by 2400 villages in six states namely Andhra Pradesh, Bihar, Karnataka, M.P., Orissa and Rajasthan. The multi media package developed by CET was used to train 47000 primary teachers in October

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[37] Ministry of Education and Culture, Govt. of India, *Indian National Commission for co-operation with UNESCO*. Report of the Secretary General, Jan 80- Decc. 81, New Delhi - 12.

1975 and August 1976, the training programmes being of 12 days duration each. This SITE programme proved to be a very effective method of training teachers in such large numbers, which otherwise would have taken 10 years. The multi media package programme of primary teachers to teach science consisted of: (a) Television programme, (b) Radio programme, (c) Activity guides, (d) Instructional materials and (e) Tutorials by a senior teacher.

It was suitably modified and used in workshops during 1977-78, to orient teacher educators of the states of U.P., Punjab, Haryana, Himachal Pradesh, Chandigarh, Jammu & Kashmir, Delhi, Maharashtra, Tamil Nadu and Kerala.

The following were the various activities of CET and educational technology cells in 11 states during 1975-84, to improve the quality of education, by promoting integrated use of mass media and instructional technology at all levels:

(a) A multimedia package programme for primary teachers to teach science.

(b) Developing and testing feasibility of methods of education designed to bring the non- school going children under a suitable education system.

(c) Self-instructional programme guides for primary school science.

(d) Proto-types of teaching materials for languages and special cassette tape cases for rural areas, and a pilot project of an open school.

CET had produced school programmes to cover science syllabi for primary through well-planned Educational Television (ETV) lessons, broadcast through INSAT (1980). The programme made use of special teaching aids including educational films tapes/slides, filmstrips and graphic aids prepared by DTA. Apart from curricular topics, many other educational themes related to population, education, health and nutrition and environmental education were also broadcast through INSAT.

The Central Institute of Educational Technology (CIET) was set up in May 1984, with the merger of CET and DTA of the NCERT. UNESCO, in co-operation with CIET, NCERT and the Ministry of Human Resources Department launched a three-year project INSAT for Education (1984-87) in 1984. UNDP has provided over $ 2 million for DTA consultants, fellowships, study grants and equipment. "The main objectives of the project were as follows:

(1) Production and evaluation of programme of national importance and prototype for regional applications.

(2) Training of production, technical and evaluation of staff of other institutions including the SIETs, involved in the INSAT programmes.

(3) Undertaking overall monitoring and impact studies as well as research on matters with the purview of CIET.

(4) Maintain information and documentation services in order to serve as an information clearing house on educational information and communication technology, particularly software cataloguing and research reports relevant to INSAT for education.

(5) Advise on the establishment of SIET's and other institutions involved in the INSAT for Education Programme, which will be established with other than UNDP resources".[38]

The CIET has a film library, television and radio studios, mobile television vans and departments for producing media materials.

The educational television production and films division of CIET is concerned with the production and capsuling of ETV programmes for in and out of school children during 200 school days of the year, in about 12 states, in five languages, through INSAT-IB. The division has been producing and coordinating the ETV component of Massive Orientation of school teachers on National Educational Policy conducted during the summers 1986, '87, '88. The division has produced ETV software in the area of teachers training under Operation

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[38] INDIA ANNUAL REPORT UNESCO REPRESENTATIVE 1986. UNESCO, NEW DELHI, p. 36.

Blackboard and provided media support to Navodaya Vidyalaya for teaching yoga.The CIET develops instructional/training materials including Audio/Video programmes, educational films and ETV programmes for children.

The following table shows the number of ETV programmes produced by CIET for children and teachers during 1984-1990.

TABLE VI(i): Number of ETV Programmes during 1984-1990

Year	*No. of ETV Programmes*	*Language Versions*
1984-85	59	184
1985-86	89	243
1986-87	100	227
1987-88	80	25
1988-89	90	85
1989-90	90	60
Total	508	824

(*Source:* NCERT.Educational Technology, NCERT Annual Report, 1989-90, 62)

The CIET organises workshops/working group meetings for preparation of ETV curriculum, development of themes and finalisation of scripts of audio programmes in different areas.

The Information Documentation and Central Film Division of the CIET has a stock of more than 8000 educational films (16mm) in the Central Film Library. These are loaned free of cost to about 4500 institutions throughout the country. The CIET produces educational films, educational charts, colour slides and low cost teaching aids in various areas, including science. It develops model syllabi for ET at B.Ed and M.Ed levels and for other developmental programmes. It also develops self-instructional manuals for ETV and radio user teachers' manuals for using T.V in the class. The CIET encourages and recognises developmental research and innovations in education technology and gives awards and merit certificates.

Under British Technical Co-operation Training Programmes, NCERT deputes teachers of CET, lecturers of DTA and artists to be trained in graphic and animation techniques for educational TV.

4.5 ACTIVITIES OF APEID IN SCIENCE EDUCATION PROGRAMME

The Asian and Pacific Programme of Educational Innovations for Development (APEID) was launched by UNESCO in the year 1972, to contribute to the building of national capabilities for undertaking educational innovations linked to the problems of national development, thereby improving the quality of life of people in the member states. The activities under APEID are co-ordinated and assisted by the Asian Centre of Educational Innovation for Development (ACEID), which is an integral part of the UNESCO Regional Office for Education in Asia and the Pacific, in Bangkok. Science and technology education has been the major area of work plan in all the four cycles of APEID from 1974 till 1991.

Members of APEID, mostly developing countries of Asia and Pacific region are actively involved in modern agriculture and industrial sectors, in particular to improve the living standards through appropriate and optimum use of local resources. A lack of scientific attitude in the public at large and a general shortage of qualified manpower in science and technology have hampered this attempt. The earlier efforts in these countries have been generally geared to the needs of the urban areas. However, emphasis is now shifted to inculcate scientific attitudes in a larger segment of people who are rural based.

During the 70s and 80s, there was a great upsurge in two aspects of science education: (1) Science for all (2) Science and Technology. APEID programmes are more oriented towards helping the countries and relating science education to specific local needs linking to real life situations, rural environment and using child's immediate environment and locally available materials for providing science experiences. APEID is helping in exchange of work experience gained in similar cultural background.

The activities of APEID are geared towards developing innovation for raising the quality of science and technology education through curriculum renewal with regard to methods, materials and evaluation, developing the competencies of science teachers and teacher educators, re-orienting school education in science and technology in response to modern emerging new technologies, promoting innovative methods and techniques for pre-service and in-service training of science teachers and encouraging co-operative network for mutual support and sharing experiences, and also for the development and application of communication technologies in science and teacher education.

In short, the regional activities of APEID, geared towards promoting quality and efficiency in science and technology education, provide an important catalyst for further development of in-country activities by using resources available in the countries themselves. This indicates movements towards self-reliance in designing and implementing innovations. With the financial and human resource assistance from APEID for the incorporation of innovative ideas and practices on a system-wise base, the quality of science and technology education has improved and expanded in India.

"The essential features of science education in India today are:

(a) Science teaching continues to be an essential component during the first ten years of schooling.

(b) Every child has opportunity to learn science during the first ten years of schooling.

(c) Since science would be available to all children irrespective of sex, caste, creed and economic status, attempts have been made to make it more meaningful and relevant to the daily life of children.

(d) The science curriculum would provide learning experiences, for developing problem solving and decision-making abilities, inculcating scientific attitudes.

(e) Science up to secondary stage (10 years) has not been presented as a discipline since the child experiences it as a cumulative experience related to life.

(f) Efforts in the present science curriculum have been directed to make learning child-centered, utilising daily life experiences so that the child appreciates the role of science knowledge in the improvement of living and also the quality of environment.

(g) Technology education has been built into science rather than being a separate subject."[39]

The science curriculum, at the end of the secondary level, aims that the learners will be able to:

"(a) understand the nature of scientific knowledge.

(b) apply appropriately the principles, laws and theories of science while interacting with the environment.

(c) use processes of science in solving problems, making decision and furthering the understanding of science.

(d) interact with the environment in a way consistent with science values like keeping aside prejudicial, social barriers for environmental protection.

(e) understand and appreciate the role and relationship of science and technology with society.

(f) develop interest in science and related issues and enjoy a richer and exciting view of world around;

(g) develop manipulative skills associated with science and technology."[40]

4.6 SUMMARY

After independence, India turned for assistance to western nations that have experienced a high rate of scientific and technological growth. Countries with a high rate of scientific and technological growth have also shown parallel progress in their economic development, indicating a direct correlation between science and technology on the one hand and economic development on the other.

The history of international co-operation in science education reveals that the inflow, which started as a bilateral aid in the 1950s, expanded to co-operation by international agencies in the 1960s and to regional co-operation in the 1970s. Initially the aid was directed towards science education in secondary schools. However in the 70s, it was expanded to cover science education at all levels. From the second half of the 1980s, the focus has shifted to primary schools and to rural communities. The focus of co-operation has also varied from time to time. Initially, the co-operation started with adoption of the science curriculum prevailing in advanced countries and a little later, adaptation of the same to Indian conditions. Of late, more emphasis is being laid on need-based science curriculum. Since the country is large and diverse, the needs vary from region to region. Thus, there is a variance in the science curriculum, regionwise.

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[39] APEID: Country Experiences: *Indian Science for All and Quality of Life.* UNESCO PROFAP, Bangkok, 1991.

[40] Ibid.

In the west, there is a clear shift from an industrial society to a technological society. India is attempting a quantum jump from an agricultural society to a technological society. It is therefore essential that the science curriculum in schools is oriented towards technology.

In order to improve the social relevance and effectiveness of education, it is essential to link science and technology education more closely with real life needs of society. Education should be related to the world of work in such a way that pupils, when faced with real life problems in a technological society, can more easily grasp the connection between theoretical and practical knowledge and also acquire attitudes and aptitudes essential for productive work. To achieve this goal, international co-operation is being oriented towards health, nutrition and the development of skills for the manufacture of modern, low cost science kits in large numbers, using indigenous resources.

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CHAPTER V

POPULATION EDUCATION

5.1 DEVELOPMENT OF POPULATION EDUCATION AT THE GLOBAL AND REGIONAL LEVELS

Population Explosion and Global Concern

Faced with a steep decline in its population, Sweden was the first country to address Population Education. The Population Commission of Sweden in 1935, called for the introduction of Population Education in the formal school system. In order to encourage marriage among the younger age group, to enable them to bear more children, the Swedish Commission undertook vigorous educational campaigns to diffuse the information.

Around the same time, Americans felt a similar concern over the declining birthrates as well. In 1943, American demographers suggested that the school curriculum should include the content area of Population Education with a view to creating an awareness of population matters and the effects of dwindling population on society.

In 1964, Philip Hauser, educationist of USA, voiced for the inclusion of population content in school curriculum, but this time the concern was exactly the opposite. It was focused on the rapid growth of population in the world, including both developed and developing countries. Thus Population Education was viewed as an educational response to the problem of both its decline and its growth. Prof. Sloan Wayland at Teachers' College, Columbia University, organised a project to prepare instructional materials related to Population Education. Proto-type materials on teaching population dynamics and critical stages of reproduction were produced and included in the Secondary Teacher Training courses.

The United Nations Fund for Population Activities (UNFPA) had played an important role in understanding the value of Population Education and started funding for Population Education programmes from the late 60s. The UNESCO held its first consultation with interested scholars to define its responsibilities in the field of Population. In the year 1968, UNESCO declared that Population Education should bring about a better understanding of the responsibilities that the growth of population imposes on individual, nation and the world at large.

First Asian Regional Workshop on Population Education

The UNESCO Regional Office for Education in Asia and the Pacific (UNESCO ROFEAP) at Bangkok held the first workshop on population and family education in September-October 1970. Educationists attended it from thirteen member states in Asia, including India. The objective of the workshop was to help students, in and out of school, and adults to understand population dynamics in relation to the developmental efforts of the nations and strive for a better quality of life.

The unprecedented population growth rate of about 2.35% in early 1970s called for multi-sectoral approach to arresting population growth. The approach of Family Planning adopted by many countries was not having a significant effect since the fertility behaviour was part of the socio-cultural values of their people. It was thought that intervention of education would be the best strategy to bring about the change in the pronatalist attitude of people. This change of attitude, coupled with the availability of contraceptives, could have the desired impact in bringing down the fertility rate in the region.

The members of the Bangkok workshop undertook the task of stating objectives, planning strategies of organizing programmes, outlining contents to be incorporated in school subjects and preparing a set of draft materials.

The workshop was technically supported by UNESCO and funded by UNFPA. The report of the workshop was used extensively by the large number of participants in developing Population Education programmes in their countries. The Bangkok workshop became a landmark in the history of Population Education.

At the Asian Regional Workshops, it was unanimously agreed that elements of population education should eventually be incorporated into all levels of the school system. This is in unison with the recommendations made at the national seminar on Population Education held at Bombay in 1969 that, since the growth of population is a major challenge that the country is facing, the population education should be an integral part of education at all levels.

The Asian Regional Workshop defined "Population Education as an educational programme which provides for a study of the population situation in the family, community, nation and world, with the purpose of developing in the students, rational and responsible attitudes and behaviour toward that situation".

The regional workshop formulated the seven general objectives of Population Education. They are to assist the pupils to acquire knowledge of —

(a) basic demographic concept, process and methodologies; (b) static and dynamic description of the population situation at the micro and macro levels; (c) the determinants of population growth, (d) the consequences of population growth; (e) the human reproductive process as a basis for understanding human fertility; (f) the national and international population policies and programmes; (g) rational and responsible attitudes and behaviour toward family size and national population programme.This would help the member countries to develop the curricula to suit the socio-cultural and educational needs of their countries.

The Regional workshop recognised the need of convincing the decision makers of the countries regarding the introduction of

Population Education materials and information within and among the countries in the region."[41]

The programme is manned by a Regional Advisory Team consisting of Regional Advisor for out of school Population Education, a Regional Advisor for in school Population Education, a Documentation specialist and a Regional Advisor for the Pacific.

The PES assists the member states in:[42]

1. ***Preparatory stage:*** The Regional Advisory Team assists the UNFPA in needs assessment exercises, to pinpoint the specific needs and areas for Population Education assistance in that country.
2. ***Awareness and orientation:*** The regional advisory team promotes activities to create awareness and generate interest among key decision-makers and administrators regarding population problems and demonstrating the feasibility of developing educational programmes both formal and informal.
3. ***Planning and Population Education Programme:*** PES assists in the designing and preparation of project requests and plans of operation for funding by UNFPA and other international agencies and the national governments.
4. ***Implementation of the National Programme:*** The Regional Advisory Team provides technical assistance, participates in and monitors training programmes, curriculum and material development, research and evaluation, builds up documentation and information services and supplies information and material to backstop information needs of the member states.
5. ***Building and mobilizing national capacities for the inter-country co-operative phase:*** The Regional Advisory Team assists in developing a reservoir of national expertise, serving as a catalyst and identifying innovative experiences in a country and facilitating the sharing and use of them by another

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41. Population Education Programme Service, *Population Education*, UNESCO's work in helping to solve the population problem in Asia and the Pacific, Principal Regional Office for Asia and the Pacific Bankok 1987

42. Ibid.

Population Education at all levels of school education through International, National and Regional Seminars, UNESCO expert teams, and literature on Population Education. Since the role of the teacher was crucial for the effective implementation of the Population Education programme, the Asian Workshop emphasized 1) the importance of pre-service and in-service training of teachers and 2) effective communication channels between the curriculum designer and the instructional system.

The "World Population Plan of Action" adopted by the World Population Conference held at Bucharest in 1974, recommended that educational institutions in all countries should be encouraged to expand the curriculum to include a study of population dynamics and policies, including family life, responsible parenthood and the relation of population dynamics to socio-economic development and international relations.

Establishment of Population Education Service (PES)

To undertake activities for the promotion of Population Education in the Asia-Pacific Region, a Population Education Service was established in the UNESCO Regional Office for Education in Asia and Pacific, in the year 1972. It was funded by the United Nations Fund for Population Activities (UNFPA).

"The goals of PES are:

1. To promote among all those involved in education process in: (a) a better understanding of the interactive relationship between population change, development and quality of life; (b) favourable attitude and values toward population problems and issues; (c) desirable fertility related behaviour.
2. To help strengthen and revitalize country programmes through: (a) the provision of various forms of advisory services (b) development of national capabilities in various aspects of Population Education; (c) organization of seminars and workshops designed to solve crucial problems faced by national projects in Population Education; (d) developing prototype curricular materials; (e) facilitating the flow of

country via conferences, meetings and study tours and exchange of personnel, information and materials.

Methods Used to Assist Member States[43]

1. Regional activities are planned on the basis of the needs expressed by the member states in Regional Consultative Seminars. The "state of the art" of Population Education is periodically assessed in the seminars.
2. The Regional Team works closely with the other programmes of UNESCO, which have clear relevance to Population Education such as APIED and Asia Pacific Programmes of Education for All (APPEAL).
3. Regional activities such as training workshops are designed to develop national capabilities on curriculum development and training both for formal and informal education system, for ongoing country programmes.
4. The materials developed at the regional level serve as illustrative examples for member states to adopt or adapt.
5. The Population Education programme of a country is pursued as an innovation and developed as an internal part of the national education programme.
6. The activities of the Regional Team are closely linked and co-ordinated with the population related programmes of other UN bodies such as those of UNDP's Development Training Support Communication Programme (DTCP), the Economic and Social Commission for Asia and the Pacific (ESCAP), the Food and Agricultural Organization (FAO) the International Labour Organization (ILO) and the World Health Organization (WHO) and other international non-governmental organizations.

Regional Consultative Seminars

Once in every four years, the member states of Asia-Pacific region assess the "state of the art" of Population Education in the Regional

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[43] Ibid.,

Consultative seminars. These Regional Consultative Seminars are convened to share experiences of the member countries in implementing the population programme and later developments and to co-operatively develop strategies of action to meet emerging needs and requirements. From 1975 to 1995, there have been six such Regional Consultative Seminars.

The achievements of PES are as follows:

(a) It has assisted the establishment of national programmes in most of the countries of the region. In Afghanistan, Bangladesh, China, Federated States of Micronesia, India, Indonesia, Malaysia, Marshall Islands, Nepal, Pakistan, Papua New Guinea, Philippines, Republic of Korea, Sri Lanka and Thailand and in some other countries, it is under way.

(b) Training and evaluation manuals are developed which can be adapted or adopted by the member countries. Audio-visual kits, source books for both content and methodology on Population Education, actual instructional materials and learning units for both formal and informal schools are also developed.

(c) PES has undertaken intercountry study tours and mobile training to develop national expertise. It has served as a forum for exchange of experience and innovation. It has undertaken regional workshops to develop skills in curriculum development, research and evaluation, management, documentation and information services. It has organized consultative seminars of experts in specific areas such as: (i) future direction of the regional Population Education programme; (ii) innovative structures and approaches in Population Education; (iii) education planning, (iv) role of colleges and universities; (v) training need and out of school programme.

(d) The RMT has assisted researchers in conducting case study and surveys in the area of Population Education. It has participated in annual and tripartite meetings and final evaluation of the national Population Education programme.

The 1984 UNESCO workshop developed packages of Adequate Learning Requirements in Population Education, core messages of Population Education and prototype learning materials, as a corrective measure to the dilution of population education content in the school subjects developed in many countries of the region. The 1985 Regional Training Workshop on Evaluative Research in Population Education developed process skills on evaluation and evaluative research, prototype evaluative research designs cum instruments. A total of 129 advisory missions were undertaken in member countries of the region during 1983-86.

(e) From 1980 to 1990, the advisory mission visited India 34 times, to provide assistance in the following areas: (a) need assessments; (b) project planning and formulation; (c) seminars and meetings; (d) curriculum materials development; (e) project review.

The development of national capabilities is an important objective of the regional programme which includes (a) regional training programmes; (b) short-term course and long-term fellowship; (c) study visits and attachment; (d) national training programme and; (e) assistance to member states in building population education. The table below provides the different modalities through which the capabilities were developed in India during the years 1983-86.

TABLE V(i): Table of Modalities

Modality	*Frequency*
Regional Training Programme	9
Study Tour	7
National Training	36
Inter country mobile training	1
Internship in population education documentation	2
TOTAL	55

(*Source:* Table 3: Development of National Expertise by country and training programmes 1983 - Aug 1986, PES. Programmes of Action to enhance the effectiveness of Population Education. UNESCO ROFEAP, UNESCO, 1987)

5.2 DEVELOPMENTAL PLANS IN INDIA

At the dawn of independence, the population of India was 342 million. During the decade 1941-1951 the population growth rate was a moderate 12.5 for 1000 population. The birth rate was 39.9 per 1000 and the death rate was 27.4 per 1000, both being high. During the decade 1951-1961, there was a sharp increase in the growth rate to 18.9, with the birth rate remaining high at 41.7 and the death rate at 22.8, falling rapidly. Since then, there has been an acceleration in the growth rate of population by about 22.2 per 1000 on an average. (Table V(iii))

According to the 1991 census, India's population was 842 million, which is 500 million more than the population in 1941. Population is projected to be one billion by the turn of the century. According to the 1991 census, India is the most populous country in the world, next only to China. With only 2.4% of world's land, India is supporting 16% of the world's population. Every year it adds 13 million more people, on an average. Every sixth man in the world is an Indian.

Effect of Population Growth on Developmental Plans

Increase in population has had an adverse effect on our developmental programmes. The addition of 13 million more people every year started putting pressure on available resources of food, clothing, housing, water, fuel, education facilities and environment. This addition of population demanded an annual increase of 1.25 million tonnes of food per year, 1.88 million metres of extra clothing and 2.5 million houses, 126,500 schools and nearly 372,500 more teachers. Increased population created more illiterates too. Although new jobs were created during every five-year plan, four million people, on an average, remained unemployed every year.

Although national income increased from Rs.9650 crores in 1950-51 to Rs.18755 crores in 1970-71, an increase of about 94%, the per capita income rose by only 28.5% from Rs.270 to Rs.347. Hence, India's per capita income continued to remain much below the international poverty level. Industrial growth resulted in unplanned urbanization, and this brought a severe demand on water, air, food, and space, causing environment pollution in the cities.

Need for Family Planning

In spite of great strides in every sector of human activity to improve the standard of living of our people, the demand for more shelter, education and employment by the growing numbers nullified the effect of the progress made in absolute terms. In order to check the population growth so that benefits of development and economical growth could be felt, the Government of India had accepted Family Planning as its National Policy. Family Planning was made an integral part of socio-economic planning in the first five-year plan and Rs.6.5 million was earmarked for the family planning activities. The activities of family planning were taken up with more vigour and conviction in the second and the third five-year plans. The budget allocation increased progressively to Rs.50 million in the second plan, Rs.269.70 million in the third plan and Rs.3150 million in the fourth plan (1969-74).

In 1952, a family planning cell was created as a nodal body under the Directorate General of Health Services. During the first five-year plan, family planning programmes were designed to discover and disseminate effective techniques of birth control. During the second plan, Family Planning Boards were set up in many of the states. Clinical approach of advising the women in family planning methods individually was used. This approach did not yield the desired effects in bringing down the population.

During the third plan, family planning programmes used the community approach. The primary health centres took up the work of birth control and conducted an intensive educational, motivational and communication campaign. This approach did produce some impressive results and resulted in removing some of the taboos in the minds of people regarding Family Planning. It created awareness among people that number and frequency of births could be controlled, especially by using contraceptive techniques.

During the fourth plan, the family planning services were integrated with Maternal Child Health services [MCH]. Abortions were legalised on grounds of health and contraceptive failure. The para-medical staff at the Primary Health Centres carried out sterlizations and termination of pregnancies. Incentives were given to persons coming forward to get vasectomy/tubectomy done, as well as to the motivators and doctors. In order to bring about birth control at a faster rate, targets were set. In order to achieve those targets, lots of excesses and compulsions were used in the programme of sterlization, bringing the Family Planning programme into disrepute. As a result of this, the number of sterlizations dropped from 8.3 million in 1976-77 to 0.95 million in 1977-78 and to 1.5 million 1978-79.

The new non-Congress government which took over at the centre during 1979, advocated: (a) greater role of MCH services, (b) expansion of immunization programme; (c) improvement of women's education and population education; (d) involvement of voluntary youth and women's organizations. The Family Planning Programme was renamed as Family Welfare Programme and, at the same time, the demographic goals for reaching population stabilization was also made. The medium term goal is to reach Net Productive Rate of Unity [NPR: 1] by 2000 A.D. with a birth rate of 21, death rate of 9 and infant mortality rate below 67, which called for 2.3 births per woman from the then current level of 4.3 births per woman.

In spite of the ambitious Family Planning Programme, the population growth rate which was 12.5% during the decade 1951-1961 rose to 22.2% in 1961-1971, a far cry from the intended goal of bringing down the birth rate to less than 12.5%. The following table illustrates this:

Table V(ii): Total Population, Birth Rates, Death Rate and Net Growth in India 1951-1991

Census Year	*Total Population in millions*	*Birth rate/1000 per decade*	*Death Rate/1000 per decade*	*Net Growth Rate*
1951	361.1	39.9	27.4	12.5
1961	432.2	41.7	22.8	18.9
1971	548.2	41.2	19.0	22.2
1981	685.2	37.2	15.0	22.
1991	846.4	29.3	9.8	19.5

(Based on: National Source Book, Page: 304, and India 1991: Population Data Sheet, Population Education Bulletin.VOL.NO.1&2. JANUARY 1993.Page 6)

Intervention of Population Education

The Family Planning Programme in India, as in other developing countries, was at first not as successful as it was hoped for and planned. Most of the organizers of the Family Planning Programme attribute this failure to misdirected effort. Eighty percent of the Indian population in rural areas was illiterate. They were pronatalists in view and had preference for sons and big families. Their low economic status encouraged more hands to help in their occupation. The higher rate of mortality encouraged having bigger families. Early marriage of children increased their fertility span.

The other important factor, which contributed to the failure of family planning programme, was its clinical approach. It was not oriented toward attitudinal changes towards the acceptance of the small family norm. The target group was married women of childbearing age, that accounted for only 37% of the Indian population. Their attitudes were already well formed and were not easy to change. The pioneers of the family planning programmes realized and agreed that education is the best means to bring about attitudinal changes and the younger age group were more appropriate educational target since 42% Indian population was under 14 years of age (nearly half of the total population of the country). They were the potential parents. Their attitude towards a small family norm would affect the future demographic scene.

Since school was an organized institution with facilities of infrastructure, students could be introduced to population and family issues through the school system. As such, a well-designed programme of Population Education was the need of the time.

5.3 EVOLUTION OF POPULATION EDUCATION IN INDIA

Genesis

In 1957, in order to introduce Health and Nutrition Education in the school curriculum, a committee was formed in the Ministry of Education. This committee, in collaboration with the Central Health Education Bureau of India, prepared a draft syllabus on health education, catering to age groups 6-11, 11-14, and 14-17 years. One of the sub-areas included in the syllabus was "Family Life Education, Including Sex Education'. Since the word Sex Education did not get the approval of many, its contents were spread out in other related areas such as Growth, Major Health Problems and Programmes and Mental Health. The intention was to help students understand the population problem and develop a desirable attitude for a small family. Content relating to sex education was included in the syllabi of both primary and secondary teacher training programmes.

In the year 1966, the Ministry of Health and Family Planning urged the Ministry of Education to involve college teachers in the Family Planning programme. The intention was not to provide Sex Education, but to make teachers aware of population dynamics as to how it was affecting the country's economy and the welfare of its people.

Dr. Sloan R. Wayland, of the Teachers College, Columbia University, and an expert in Population Education, visited India in 1968, as a representative of the Population Council, Columbia University, to assist in developing National Population Education Programmes. He explained that, "regardless of any terms used, we are concerned about the inclusion in the formal education system of instructional settings in which young people will come to understand the circumstances which have led to the adoption of family planning. This would include an understanding of the relationships of population dynamics to economic and social development of the country and the implications of family size for the quality of life of the individual and the family. The particular subject field would of course be devised in a manner, which would be pedagogically sound and appropriate for the particular society"[44]

Prof. Sloan Wayland, who coined the word "Population Education", suggested measures for developing Population Education through the educational system in India.

In mid 1968, UNESCO forwarded proposals to various countries, including India, about prototype projects on Population Education. This was received by the Ministry of Health and Family Planning and Urban Development through the Ministry of Education. The prototype projects had many similarities with the proposals in the fourth five year plan. Dr. C. E. Gurr, an educationist who came to India in 1969 with the UN Mission, strongly recommended the development of a programme on Population Education at all stages of education in the country. The Ministry of Health and Family Planning and Urban Development initiated a programme of debates and essay competitions in the universities on the theme of growth of population and its adverse effects in our development plans. This became an annual feature in the colleges and universities. Besides, the Government of India and international agencies like UNESCO, the voluntary organizations in the country have also contributed substantially to the development of Population Education. programmes. In March 1969, the Family Planning Association of India, which is a voluntary organization, conducted a two-day seminar in Bombay on Population Education for the younger generation. The objective of the seminar was to create a general interest in the subject and help to build on informed opinion, This seminar was attended by representatives of various health and educational organizations and about 40 schools in Bombay. The teachers were involved in developing a programme of Population Education.

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[44] K.R.Sarkar, *Population Education for Developing Countries*, Report of National Seminar on Poulation Education, Bombay, NCERT, 1960, 100.

In June 1969, the Institute for Social and Psychological Research at Bangalore organised a One-day Panel Discussion on Population Education.

Population Education as an Intervention Strategy

On 2nd and 3rd August 1969, the Ministry of Education and the Ministry of Health and Family Planning at Bombay jointly organized the first national seminar on Population Education. The objectives of the seminar were (a) to review the initial work done so far in population education by different official and non-official agencies, (b) to clarify the concept and objectives of Population Education and (c) to develop a plan of action for introduction of Population Education in the curriculum at different stages of education.

For this seminar, the NCERT department of social sciences provided the academic services. A brochure entitled "Reading of Population Education" was brought out, which included published papers on the different aspects of population and also important demographic information about India and the world. Several organizations, both-Indian and foreign, rendered help.

Eminent educationist and the then Union Minister of Education Dr.V. K. R.V.Rao inaugurated the seminar. He pointed out: "the Population Education is but a part of human resource development and that numbers and size of families should be treated as a determinant of quality and opportunities, for improvement in quality rather than an absolute factor related to food supply. Thus the quality of the population, among other things, would seem to be determined not only by numbers, but also by health maintenance and nutritional betterment."[45]

The seminar was attended by senior officers of the Ministry of Education and Youth Services, state representatives, specialists in the field of education, Family Planning, Demographic Training and Research Centre, Institutes of Sociology and Psychological Research, Ministry of Health, etc. Members representing USAID, Ford Foundation, Population Council, Columbia University and noted personalities like J P Naik, Advisor, Ministry of Education and Youth Services, Dr. S Chandrashekhar, Minister of State in the Ministry of Health and Family Planning, Dr. Sloan R Wayland representing Population Council USA, Smt. Avabai B Wadia, President, Family Planning Association of India and Smt. Dhanwanthy Rama Rao, President, International Planned Parenthood Federation, Bombay, actively participated in this seminar.

The recommendations of the Seminar were as follows:-

(a) The objective of Population Education should be to enable the students to understand that family size is controllable, that population limitation can facilitate the development of higher quality of life in the nation and that a family size can contribute materially to the quality of living for the individual family. It should also enable the students to appreciate the fact that, for preserving health and welfare of the members of the family, to ensure the economic stability of the family and to assure good prospects for the younger generation, the Indian families of today and tomorrow should be small and compact, with only two or three children.

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[45] Mehta and others, *National Seminar on Population Education*, Inagural speech by V.R.R.V. Rao, Aug.2, 1969,5.

(b) Population Education should be introduced into the existing curriculum of schools and colleges and appropriate subjects of study included suitably in the curriculum.

(c) A separate "Population Education Cell" should be established in the NCERT in order to develop suitable curricula on Population Education at the school age. The cell should work in close collaboration with the Central Health Education Bureau, Central Family Planning Institute and other agencies (both official and non-official, interested in the programme).

(d) Immediate steps must be taken: (i) to clearly define the content of Population Education at different stages and evolve suitable methods for teaching and examination; (ii) to prepare books, supplementary reading materials, audio-visual aids, teachers' guides, etc., needed for successful implementation of the programme; (iii) to organise courses on Population Education in the Teachers' Institutions and Colleges at the primary as well as secondary levels; (iv) to organise in-service training in Population Education; (v) to require specialisation in population education for teacher educators at the postgraduate level.

At the first Asian Regional Workshop held in Bangkok in 1970, it was the unanimous consensus that elements of population should eventually be incorporated into all levels of the school system.for the following reasons:

(a) At Primary Level: Large family norm is more prevalent in villages. Hence, there is a need to bring about the concept of small family norm in rural children at the primary level.

A large number of students can be influenced at the primary stage, and it is at this age that important attitudes of life and social values are formed. Most of dropouts from the school are at the end of this stage of schooling. In later years some of them become leaders and have influence over the local community.

Since there is a common curriculum without any optional subjects in primary classes and most of the rural schools are single teacher schools in most of the developing countries, inclusion of population content in the common curriculum for all the students in the same class becomes easier. At this stage, very simple ideas regarding family size and happy family life should be included. The teachers of the primary schools should be trained and supplied with instructional materials. There should be well written lessons including simple concepts in the school textbooks.

(b) At Secondary Level: The students, by the time they leave secondary school, are around 16-17 years of age and are at the threshold of their reproductive stage. Many of them, who leave school at this stage, will take up middle level leadership and as such they may influence the masses to a considerable extent.

The population education at this level will be more effective on their minds, as, being older and mature, they understand the relationship between population growth and other variables.

It is easier at this stage to discuss about the implications of population pressures at micro and macro levels. The diversity of subjects and the availability of specialist teachers in different subjects at the secondary stage make it easy to include the elements of population contents in different subjects. The topics, which were controversial or difficult to include at the primary level, can be easily discussed in a comprehensive manner. (a) The emphasis on small family and its analogy at the community, nation and world as a whole; (b) the problem of uncontrolled population growth on different aspects of life; (c) critical thinking on population issues and (d) sound application of knowledge to the real world should form the contents of population education. The teachers at this stage have to be re-oriented in subject knowledge and trained to develop attitude and skill.

(c) At College Level: The students at the college level constitute a priority target of a population education programme, as their decision regarding marriage and reproduction has the immediate impact on population growth. At this stage, elements of family planning methods may be introduced in the content of population education. For this target group, the National Seminar on Population Education 1969, recommends the following steps: (a) to introduce a course of demography at the under-graduate level, so that those who are interested can specialise at the post graduate level (b) to arrange extension lectures to bring about widespread awareness among youth and teachers and (c) to strengthen college level Guidance Bureau to solve personal problems.

Strategies to Introduce Population Material to School Curricula

Considering the multi-disciplinary nature of population study, and with a view not to burden the over crowded school syllabus, it was decided to incorporate population education material by infusion method, in subjects like social studies, health education, mathematics, biology, languages, economics and geography.

NCERT outlined a syllabus for population education covering the following six major areas:

(1) The population growth.

(2) Economic development and population growth.

(3) Social development and population growth.

(4) Health, nutrition and population.

(5) Biological factors — family life and population.

(6) Population programmes — national and international.

Population education was a new area of education; as such, a sufficient amount of expertise had to be built up. So, a band of teacher educators and teachers from schools and colleges were given training in many areas of population education by a team of experts in diversified fields. This produced a first set of resource persons in population education. The expertise and insights of the staff associated with the Family Planning Association of India, which has done valuable work in the field, was made use of in the implementation of training at a national level.

Population education was also made an integral part of pre-service training as well as in-service training of teachers at primary and secondary level.

5.4 NATIONAL POPULATION EDUCATION PROJECT

After a decade of spadework in population education between 1970 and 1980, the Government of India, with the ultimate aim of institutionalizing Population Education in schools, formally launched the National Population Education Project (NPEP) in April 1980. The project was funded by the United Nation Fund for Population Activities (UNFPA) with the technical assistance of the UNESCO Regional Office at Bangkok. At the national level, the Ministry of Education is the implementing agency with the technical assistance of NCERT. The State governments contribute to the tune of 10% of the total allocation.

It was planned to implement the project in two cycles of 5 years each, 1980-85 and 1986-1990. During the first cycle, Bihar, Chandigarh, Gujarat, Haryana, Karnataka, Madhya Pradesh, Maharashtra, Punjab, Rajasthan and Tamil Nadu (1980-81), Andhra Pradesh and West Bengal (1981-82), Andaman & Nicobar Islands, Dadra and Nagal Haveli, Goa, Daman and Diu, Manipur, Meghalaya, Mizoram, Nagaland, Pondicherry, Sikkim and Tripura (1982-83), joined the NPEP project. By December 1986, 26 states and union territories joined the project in three phases. By the end of the second cycle, the remaining states Arunachal Pradesh, Jammu and Kashmir and Lakshadeep joined the programme.

During the first cycle, the project covered formal education system from Standard 1 to Standard 10, and teacher education at elementary and secondary levels. During the second cycle, the project covered higher secondary stage and adult education.

Goals and Objectives of NPEP

The primary goal of the NPEP was to gear the entire educational system in the country to the realization of the potential role of education in the developmental efforts of the country and of the interrelationship between Population Education and different aspects of the quality of life at the micro and macro levels.

To achieve the above goal, the following long-term objectives were formulated:

(a) To help students develop an insight into the interrelationship between population growth and process of social and economic development at the individual, family, society, national and international levels.

(b) To make the students and teachers aware of the population situation in the country and the targets and the efforts of the government of India in solving the problem.

(c) To institutionalise Population Education in the formal education system, universities and non-formal education programmes, at the national and state levels.

(d) To develop desirable attitudes and behaviour in teachers and students as well as the community at large, towards population issues so that they may make rational decisions about their family size and the quality of life that they would like to have.

The immediate objectives in the first cycle were as follows :-

(a) To establish Population Education cells at the national and state levels with teams of full time technical personnel, who will be responsible for the implementation of the programme.

(b) To develop prototype curriculum and institutional material, training packages and audiovisual aids at the national level which can be adopted or adapted by the states.

(c) To develop exemplary lessons for radio and television programmes.

(d) To bring out a quarterly newsletter on Population Education.

(e) To assist the states in developing curriculum and materials for students, teachers and other personnel.

(f) To orient key personnel from the states, universities and national organisations through national and regional training programmes.

(g) To train teacher educators and administrators of the National Population Education project at the National Staff College for Educational Planners and Administrators.

(h) To train selected key personnel from the states and universities through inter country study tours.

(i) To conduct research studies and action research programmes on the impact of Population Education, the attitude formation and behaviour patterns of students in the formal as well as non-formal systems.

(j) To initiate and promote Population Education for out of school children below 14 years in the non formal education sector.

(k) To develop curriculum, materials and special programmes for the out of school girls in the age group 6-14.

(l) To initiate and promote Population Education in universities for introducing relevant courses of studies and undertaking functional research in the crucial area.

(m) To promote "clearing house" functions at the central level, so that information, ideas, experiences, innovations, materials, etc., are pooled together from all over the country and abroad and shared by states, their specialised agencies, functionaries and experts.

The objectives of the second cycle were as follows:

(a) To impart to the students and teachers as far as possible the core messages of Population Education by giving greater emphasis on the core messages.

(b) To develop prototype curricular and instructional materials for +2 stage.

(c) To develop prototype teaching and learning materials for the use of the instruction of the non-formal education centres.

(d) To develop AV aids and other suitable TV and Radio programmes.

(e) To translate selected Population Education materials from regional languages into English and Hindi.

(f) To generate population awareness through various co-curricular activities at national, state and local levels by organising competitions and instituting state awards.

(g) To promote and conduct longitudinal studies to evaluate the changes in the behaviour of students over a period of time.

(h) To assist states and UTs in the implementation of their projects.

Organisational Set-up of NPEP

At the national level, the Union Ministry of Health and Family Welfare does the financial and academic monitoring of the project and interacts with UNFPA, the Ministry of Human Resource Development (MHRD) and Population Education Unit (PEU) of NCERT. MHRD is the implementing agency and arranges for funds for the project and continuously keeps a watch on the progress of the project.

The Steering Committee at the national level and Advisory Committee at the states level review periodically the implementation of the project and take necessary decisions to bring about the intra-sectoral and inter-sectoral coordination for the effective implementation of the project.

National Steering Committee: The members of the National Steering Committee are drawn from the departments of school education and adult education, MHRD,Ministry of Health and Family Welfare (MHFW), Ministry of Finance, Ministry of Information and Broadcasting, University Grants Commission, Planning Commission, Central Boards of Secondary Education, Family Planning Association of India, radio and television agencies, education secretaries, State Councils of Educational Research and Training [SCERT], State Institutes of Education [SIE] by rotation. The Education Secretary of the central govt. presides over the committee.

State Advisory Committee: The State Advisory Committees have been constituted in 24 States/UTs and include representatives from school education and adult education departments, Education Boards, universities, textbook corporations, departments of Health and Finance, media, radio/television, voluntary agencies and teachers. The Education Secretary at the state level presides over the committee.

Population Education Unit (PEU): The PEU was created in NCERT in 1969, but it started getting financial support only after NPEP was launched formally in 1980. The PEU of NCERT implements the programme of NPEP on behalf of the MHRD. The director of NCERT is the honorary director of the project. The PEU consists of a coordinator and a staff of 9 academic and 12 administrative personnel. The PEU has following major functions in: (a) curriculum and material development; (b) training of resource persons and functionaries; (c) co-curricular activities; (d) research and evaluation.

State Population Education Cells (SPECs): Population education cells were set up in all 28 States/UTs. At the state level, the Department of Education is the implementing agency for the programme of NPEP. The SPEC, set up in the State Institute of Education (SIE) or State Council of Education at Research and Training (SCERT), implements the programme on behalf of the Department of Education. The functions of SPC are similar to those at the national level. The director of SCERT is the honorary director of the project. The SPECs conduct project activities with the help of educational infrastructure at district and block levels to reach the schools and conduct project activities for Teacher Training Institutes and Colleges.

Curriculum Development

The project took up activities aimed at effective integration of its elements of Population Education into the syllabi, lessons in the text books of different subjects at suitable entry points. This was the critical area of the project, which had to be done effectively to realise the aim of integrating Population Education. Even before the launching of the project in 1980, the PEU was active in formulating the guidelines for introducing Population Education into existing textbooks. As a first step, a National Base line survey was conducted in 1979 to assess the existing status of Population Education in school syllabi and textbooks at the school level and teacher education levels, and identify the suitable entry/plug points, where the contents of Population Education and could be introduced. The Draft syllabus, which identified the major areas of contents of Population Education and which could be suitably integrated into the syllabi and textbooks, was placed before states/UTs as a module to initiate activities at the State/UTs level.

The six major areas identified were: Population Dynamics (determinants and demographic situation); Economic Development and Population Growth (consequences); Social Development and Population Growth (consequences); Health, Nutrition and Population; Biological Factors and Family Life and Population; Environment and Population Programmes.

(1) Population Dynamics: Demographic features like birth rate, death rate, infant mortality rate, growth rate, life expectancy, family size, sex ratio and proportion of dependent population are all indicators of socio-economic development of a nation. The population education can use these demographic data (a) to compare with socio-economic development of other countries (b) to plan and formulate policies to improve the quality of life of the people.The standard of living of general mass, per capita income, depends upon the quality and productivity of the labour force, age structure of the population, rate of literacy, proportion of dependent population and women's participation.

Population dynamics acts like a qualitative input and facilitates in bringing about changes in a desired way.

(2) Economic Development and Population Growth: When population growth rate outgrows economic growth rate, it creates problems like unemployment, underemployment, fall in availability of social services, fall in per capita income and lowering the living standards of people. This is due to the fact that national resources have to sustain greater population than what they are capable of. This situation often forces the country to depend on foreign aid with all its consequences.

The vicious circle of deplorable poverty leading to reckless population growth and consequently contributing to further lowering of living standards results in widespread misery and deprivation. Accelerating economic growth and decelerating population growth rate simultaneously can only break this. The standard of living has to be achieved primarily through marked improvement in the productivity of working class and/or nurturing human resource base. The classic example of Japan with much higher density of population, with very little natural resources, could maintain very high standard of living mainly through its high productivity of its working force is a beacon to India.

(3) Social Development and Population Growth: No society can achieve the goal of social development unless half of its population, that is women, has access to education. The value of women as childbearing machines will have to be reduced and their social status has to be augmented. Equality of sexes, equal participation of male and female members in the decision making in the family, importance of education of girls, economic independence for women, in short, empowerment of women, have an impact on the demographic situation. It has been found that the education and employment of women ensure the automatic raising of age at marriage for men and women but more so to women. This brings down the fertility rate.

Unplanned population growth rate leads to social problems, as it puts pressure on the availability of social amenities. Accepting a small family norm will improve the quality of life. It also subsumes removal of values like preference for a male child, child as an economic asset and child as a gift of God, which are all obstacles for social development.

(4) Health, Nutrition and Population: In order to lead a healthy life, observance of health practices and hygienic habits are necessary. Over-crowded population with unhygenic surroundings contributes towards spread of epidemics and communicable diseases.

Proper spacing in bearing the child and adequate nutritious food to pregnant and lactating mother ensure good health to mother and child. Immunization of children, breast-feeding are essential for child survival. In the developing countries, civic and hospital facilities which are not adequate are strained further by the unplanned population growth and thus the health of the people is jeopardized.

(5) Biological Factors and Family Life and Population: Reproduction is a natural process in animals, plants and human beings. Only human beings are capable of making intervention in the process of reproduction by using contraceptives. Education of girls is a very important factor, which brings down the fertility in a woman. Education and employment give a better status to women. She can marry late, she can space her children, can take better care of family and make judicious use of contraceptives. An educated mother is in a better position to ensure the small size of the family and its wellbeing.Quality of life improves where father and mother are equal partners, share equal responsibilities and decision making power. Family is a natural and fundamental institution, which has to be protected by the society and state. Population Education should promote the sanctity of this institution and strengthen mutual bonds among all its members.

(6) Environment and Population Programmes: Unplanned population growth affects the environment. More people need more air, more water, more soil and more food. So, there will be exploitation of the surroundings for the survival of the people. People interfere with the eco-system, cut down the forests, kill animals, pollute water, etc. There will be an excessive utilisation of resources, creating ecological imbalances. There will be pressure on fuel and energy and other resources. Population Education will teach them that there should be a balance maintained between resources and their utilization, judicial use of natural resources, observance of conservation, avoiding wastage and protection of plants and animals.

At the State Level, there were remarkable achievements with regard to curriculum development and incorporation of Population Education elements in existing syllabi. Status studies were conducted to know the nature of population-related contents that exist in the school syllabi, proper plug points in the ongoing syllabi and textbooks were identified and comprehensive curriculum on Population Education for different subjects was prepared.

During the first cycle, between 1980-85, the states conducted several workshops where subject experts, teacher educators, heads of schools, educational supervisors, practicing teachers, subject and curriculum specialists participated in large numbers to develop curriculum documents.

By the end of the first cycle, 25 States/UTs had developed comprehensive curriculum in Population Education for elementary, middle (upper primary) and secondary stages (i.e. Std 1 to 10) and 21 states have been able to integrate Population Education elements into their syllabi.

Development of Textbook Lessons

As per the recommendations of the first National Seminar on Population Education in 1969, the NCERT had developed lessons on the themes of Population Education and these were incorporated in NCERT textbooks. Some sample lessons were prepared in four national workshops and were circulated among the states for them to develop such lessons for their textbooks. By the end of the first cycle of NPEP, seventeen states developed such lessons and 12 states incorporated them in their existing textbooks. The number of lessons incorporated was 392 and the total number of students exposed to Population Education was 72.01 million, which represents 66.09% of the total student population.

The research conducted by NCERT at the end of first cycle revealed that although the learning outcomes in terms of knowledge and understanding were significant, it was less effective in terms of skills and attitudes. In addition to it, the feed back and the research finding brought forth the following limitations of the integrated approach which were adopted in the introduction of Population Education contents in the syllabi and textbooks during the first cycle:

(a) Although the ideas and contents of Population Education have received a comprehensive and effective treatment in certain subjects, they lack the desired sharpness and focus.

(b) The contents of Population Education are spread too thinly, in too many subjects.

(c) All the concerns of Population Education are not reflected adequately and effectively in the textbooks.

(d) The integrated contents either have population bias or subject content bias.

(e) There has been a dilution of Population Education content.

On the basis of this feedback and in view of the adoption of National Policy on Education in 1986, it became desirable to review the conceptual framework of Population Education, which was developed in 1971. The syllabi and text books of Standard I - XI were revised by NCERT and the population revised contents were integrated at suitable entry points. The States/UTs also conducted activities to ensure effective integration as and when the syllabi and textbooks were revised after 1986.

During the 2nd cycle, two workshops were held, one at Nainital from July 3 to 7, 1986, and another at Puri from Feb 16-22, 1987, to prepare and finalize a draft of the curriculum for +2 stage in different subjects. Curriculum experts, subject specialists, teacher educators and teachers attended the workshops. The draft was circulated to States/UTs for their use as prototypes.

Core Areas & Messages

The National Policy of Education in 1986 specified ten core curricular areas. Among them, five areas formed the basis for incorporating the minimum essential ideas of Population Education. These were: (a) equality of sexes, (b) protection of the environment, (c) removal of social barriers, (d) observance of small family norm and (e) the inculcation of scientific temper.

With the co-operation of international agencies like UNFPA and UNESCO, projects similar to NPEP were being implemented in other developing countries in Asia and Pacific regions more or less at the same time. The feedback from these countries was akin to the findings of the research conducted by NCERT, at the end of the first cycle of NPEP.

In 1982, the Regional Consultative Seminar in Population Education noted that population contents integrated in school subjects and non-formal educational programmes were inadequate in bringing out the desired attitudinal change regarding population issues and problems. Population concepts tend to be spread too thinly in too many school subjects. In doing so, the message tends to be less affective. To obviate this problem, UNESCO conducted a regional workshop in 1984. This workshop, which was an answer to the short-comings of the several country NPEP programmes, identified the following core messages of Population Education and had developed prototype learning materials which are known as Adequate Learning Requirement in Population Education. The core messages developed were: (a) family size and family welfare, (b) delayed marriage, (c) responsible parenthood, (d) population change and resource development, and (e) population related beliefs and values.

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These messages were well suited to the Indian situation, with the addition of one more message, "status of women", to identify the Minimum Essential Ideas and Contents under the broad framework of the objectives of NPEP.

The Minimum Essential Contents of Population Education were identified and finalized in a national workshop in Patna 1988. Curriculum and subject experts, representatives, attended this from States/UTs and UNESCO experts. A document entitled Minimum Essential Contents of Population Education was brought out. Based on this, a compendium of lessons on Population Education was also developed. The revised contents of Population Education based on the core areas were identified for all levels of education.

The contents were not only related to the six core messages but were also drawn from the Population Education areas identified earlier.

Core Message	*Population Education Content Area*
(1) Family size and family welfare	Economic development
(2) Delayed marriage	Social development
(3) Responsible parenthood	Environment and resource
(4) Population change and resource development	Biological factors,family Size and population
(5) Population related beliefs and values	Health and nutrition
(6) Status of women	Population dynamics (Demographic Implication)

The following table shows the number of States/ UTs which integrated the population education elements and revised their syllabi and textbooks by the end of second cycle.

TABLE V (iii): Number of States/UTs showing Integration Stage-wise

Syllabi/ Textbooks	*Primary stage*	*Upper primary stage*	*Secondary stage*	*+2 stage*
Syllabi	24	23	19	10
Textbooks	23	21	14	8

(Report on Needs Assessment 1990 and Project Progress, 1986-90)

Teacher Education

Integration of Population Education into the courses of elementary, secondary and teacher education is vital. With the initiation of the process of revamping of teacher education courses and the newly emerging infrastructures like District Institute of Educational Training (DIET) and College of Teacher Education (CTE), since 1986 the project activities at all levels have been directed towards the integration of population education into their courses and activities. These sustained and specific efforts made by the states helped the integration of population education contents, particularly at the elementary teacher education level; (a) A publication entitled Population Education for Teachers was brought out by PEC in the year 1972 itself. This contained the draft syllabus in Population Education for B.Ed/B T level, (b) In 1983, guidelines and curriculum outlines for pre-service teacher training course were also developed, (c) The curriculum for elementary teachers' training was developed and finalized at two national level workshops during the year 1986 and 1987. This was later distributed in States/UTs for use as a prototype, (d) 17 States/UTS incorporated Population Education into ongoing syllabi for elementary training course, (e) 14 States incorporated Population Education in B.Ed courses and (f) 8 states incorporated Population Education in M.Ed courses.

Teacher Training/Orientation of Functionaries

The most important determinant of success in institutionalising population education is the training of teachers, teacher educators, and other project functionaries and education functionaries within a reasonable time. Hence training and orientation formed a significant part of the project during both the cycles. The PEU of NCERT was very active during the first cycle, orienting project personnel, textbook writers, radio and TV personnel, scriptwriters and other educational functionaries in the field of Population Education.

The training modality at national level used hierarchical face to face training. The entire process started at NCERT. It trained the project personnel of each State/UT. and adequate number of textbook authors and scriptwriters from State/UT. The National Institute of Education Planning and Administration (NIEPA) was made responsible for orienting the senior Education Planners and administrators from the states.

The following training activities were carried out:

(a) At the four regional workshops held in 1979, 26 States/UTs involving many governmental agencies and non-governmental agencies were oriented and exposed to ideas related to Population Education. This was done with the active cooperation of UNESCO regional office for Education in Asia and Pacific, Bangkok.

(b) The actual training activity began with the twin-workshops during 1980, in the 9 States / UTs which joined the first phase of the first cycle. The first one was for orienting the participants in curriculum development and preparation of materials and the second one was on orientation, training and programme evaluation for the project personnel. In the later two consecutive workshops, the officials of other States/UTs who joined the project in the next two phases were also trained.

(c) Between March 1981 and March 1984, eight workshop-cum-training sessions were conducted at different intervals of time, of duration varying from 3 to 10 days to orient (i) textbook authors for both formal and non-formal education sectors, (ii) artist teachers to develop teaching aids.

(d) The training programmes, one for key person selected from the non-formal education centres and project personnel from States/UTs, another an intensive national level training for non-formal education sector were organised during Nov 1986 and Feb 1987 respectively. About 40 persons were trained in Population Education.

(e) During September 1987, an orientation programme for script writers was arranged at Delhi.

(f) Professors of Education, Deans, Principals, Headmasters and Teacher Educators of 496 secondary teacher-training colleges were oriented by the four RCEs'.

(g) Two interstate-visits were arranged, one to Maharashtra to see a massive teacher training programme and another to Madras to experience the varieties of effective co-curricular and curricular activities in the state of Tamil Nadu.

(h) Two inter-country visits were arranged for the national project personnel to enable them to study the features of Population Education implemented there. The first team visited the People's Republic of China, South Korea and Thailand. The second team visited Indonesia, Philippines and Thailand. The duration of the inter country visit was for two weeks between Feb. 3, and Feb. 18, 1985.

(i) During the second cycle, two training programmes for the project personnel at state and national levels have been organised at UNESCO Principal Regional Office, Bangkok.

(j) Since India is a member of the Population Education Service (PES) of Asia-Pacific Region, which was established in 1972 for Regional Co-operation, India interacts regularly in all its activities.

Modalities of Training at the State Level

During the first cycle, the teacher and other educational functionaries at the state level were trained by adopting: (a) Centralized hierarchical face to face training strategy. The members of the project team at the state level organised and conducted all the training programmes for various target groups at the state, divisional, district and block level, taking help of the key and resource persons who themselves were oriented earlier, (b) In the decentralised training strategy, the project team trained the key and resource persons, they in turn conducted training programmes for teachers at lower levels. The members of the project team only coordinated and supervised the teacher training programmes, (c) During the second cycle, training for Population Education was made an integral part of the programme of massive orientation of school teachers (PMOST) which has been organised throughout the country to orient teachers in the National Policy of Education-1986. Some states made efforts to integrate Population Education into their ongoing training programmes, (d) With the emergence of DIETs and CTEs, attempts have been made to integrate Population Education into their course and activities.

TABLE V(iv): The Number of Different Target Groups Trained

Target Group		*Number Trained*
Key resource persons		50,266
Teacher educators		17,614
Teachers	Elementary	8,23,370
	Secondary	2,63,329
	Others	19,297

(*Source:* Report on Needs Assessment, 1990, National Population Education Unit, NCERT).

The following Table reveals the vast number of teachers who are yet to be trained in comparison to the number who have been trained. (As per the report on Needs Assessment, 1990)

TABLE V(v): Percentage of the total number of teachers and teacher educators covered by States/UTs

	Elementary teacher educators	*Elementary teachers educators*	*Secondary and +2 stage teachers*
Below 40%	14 states	12 states	15 states
40 to 49%	5 states	5 states	7 states
50 to 59%	4 states	3 states	4 states
60 to 80%	3 states	6 states	—

(*Source:* Report on Needs Assessment 1990, PEU, NCERT)

This shows that most of the states have covered the training for 40% of elementary teacher educators.

Note: As on January 1996, over 2 million teachers and other educational functionaries have been oriented. There are more than 2 million teachers still to be oriented in Population Education.

Development of Instructional Materials

During the first cycle of implementation of the project, the following instructional materials were developed at the national level: (a) Evaluation tools; (b) A resource book on Population Education entitled "Inception to Institutionalization"; (c) Script for Radio/ Television programmes and (d) Annotated bibliography.

Two tape-slide sets, one consisting of 264 slides and taped commentary in Hindi and English languages (which have been converted into video cassette tape later on), the other prepared on the basis of paintings by students who participated in the National Children's Painting Competition held in 1985. These were produced with the collaboration of Ministry of Education and UNFPA.

During the second cycle: (a) a video film entitled "Population Growth and Environment" was completed, (b) exemplary materials on the five major themes in the area Small Family Norm were produced and (c) training modules on Population Education, one each for primary and secondary teachers were used in the Massive Training Programme in 1986, which were used as resource materials in later training programmes.

Co-Curricular Activities

Since the importance of the co-curricular activities in transmitting the population messages was realised from the very outset, efforts have been made to include co-curricular activities both at the national and state levels. This involved the active participation of students, teachers and the community.

The first National Painting Competition for school students was arranged in the year 1985. The theme of the competition was "Population Situation in India: Today and Twenty Years Later". The students of all the three stages (primary, middle and secondary) participated in this programme. Five students from each stage were awarded prizes for best entries at the state level. Three at each level out of these fifteen won the prize at the national level. A book of paintings entitled "India: My Children, My Future" was published, based on these paintings.

During the second cycle, two major community based activities were taken up: the Village Adoption Programme and the Population Education Laboratories. The Village Adoption Programme is very popular in all the States/UTS. In this programme, students identify the problem area in a village by conducting survey and collecting information. Different kinds of activities are planned and conducted by students and teachers and these activities are directed towards making the community understand the implication of the problem and involve them in taking remedial measures to remove that problem. This can help the community appreciate various socio-economical developmental impacts in the areas of sanitation, health, nutrition, mother and child care, immunization and monitoring the child development, literacy, girls' education, universal education and self employment. Population Education Laboratories have been set up to try curricular, textual, instructional and audio visual materials to assess the impact on students and teachers and to promote innovative experiments for their wider use all over the state and to involve teachers and students.

From January 1989, the PEU started publishing half yearly bilingual bulletins entitled "Population Education Bulletin" for a wider dissemination of information on innovative programmes and projects. During the second cycle, an All India Essay competition on Population Education was organised (Feb-March 1986). More than 3000 students participated. A volume entitled "India: Voice for Future" containing award winning essays was brought out. An All India Quiz competition was also planned and conducted during the second cycle on similar lines. The following table gives co-curricular activities conducted at state level by the end of the second cycle:

Table V(vi): Status of Activities

Kind of activities	*No. of States*
Essay competition	24
Painting competition	22
Quiz competition	18
Debate competition	6
Exhibition	4
Puppet/Model show	1
Elocution competition	5
Youth parliament	1
Folk songs	4
Story Telling	22
Dance/Drama	23
Population Day	22

(*Source:* Report on Needs Assessment, 1990)

Evaluation Study/Tools

The following evaluation study/tools were developed by PEU and PEC's after 1980:

(a) evaluation tool for curriculum, (b) evaluation tool for text book lessons, (c) evaluation tool for training, (d) evaluation tool for instructional materials, (e) evaluation tool for class room/demonstration lesson, (f) population awareness test level A, level B, and level C, (g) evaluation study to assess effectiveness of syllabi and text book, (h) awareness test, attitude scale and appreciation test for Class XI students, (i) review of institutional material developed by states, (j) project progress reports, (k) report of needs assessment 1990 and (l) a study on cost effective training modality.

Evaluation of NPEP by IIPS, Mumbai (1989-90)

Towards the end of the second cycle, the International Institute of Population Sciences (IIPS), Mumbai, was entrusted by UNFPA to conduct a comprehensive evaluation of NPEP.

The States/ UTs covered by this study were Bihar, Maharashtra, Gujarat, Kerala, Orissa, Mizoram and Delhi. As a part of the study, content analysis of text books of Class I to X of these states was carried out, to study the inclusion of POPED contents and their effectiveness in bringing out the required impact on learners by testing the students at the end of Class VI, VIII & X and also teachers of primary and secondary schools. In all 16,476 students, 2451 primary and secondary teachers and 534 principals / headmasters were tested.

The evaluation study analysed the various aspects of the project which included the areas of curricular development, orientation and training, co-curricular activities, research and evaluation and impact of NPEP on the cognitive (awareness) and non-cognitive (attitude) aspects of learning outcomes in both students and teachers.

The study reported the following major findings:

(a) The awareness of students increased in the order VI, VIII and X.

(b) Mass media like print, audio & video provide the effective medium of exposure.

(c) Students are in the process of forming a favourable attitude towards population related values.

(d) Co-curricular activities have a greater impact on the awareness aspect of the learners.

(e) Teachers who are trained in Population Education showed better performance on both awareness and attitude scale.

(f) Population Education Cells (PECs) are not equipped with trained personnel.

(g) Some of the contents and resources have been covered much, whereas contents related to family size and its implication are not focussed well.

(h) A large gap was observed between the lessons developed by PEC and those integrated into the textbooks.

(i) A lot of duplication was mainly due to lack of proper documentation and distribution of materials.

(j) A very low percentage of teachers trained in POPED.

(k) The duration of training was inadequate.

(l) The area of research and evolution was found weak with very few studies undertaken so far.

The study made the following important recommendations:

(a) The expertise within state PECs should be strengthened.

(b) Special training in research methodology should be provided to PEC personnel for strengthening the research and evaluation component.

(c) A pool of trainers should be created by providing a minimum of 2 months intensive training; training of teachers should be of at least 25 months duration.

(d) PEC should determine target groups for training and chalk out the training programmes regularly.

(e) Training programmes should be monitored and supervised by the staff of PECs. Deputation and attendance of teachers in their training should be ensured.

(f) To achieve integration of POPED in the curriculum at different stages, PEC co-ordinators should be included in the curriculum development committee.

(g) Materials produced by PECs' should be dissipated regularly among states to avoid duplication of work.

(h) Frequent changes in the project personnel should be avoided.

(i) Project Progress Review (PPR) meetings should be used for exchanging the innovative ideals.

Though the second cycle of Population Education ended in 1990, the period of two years, 1991 to 1992, was considered as extension of the second cycle, as most of the projects were financially supported by earlier savings. The NPEP entered the third cycle from January 1993. It is included in the 8th five-year plan., At present 29 States/UTs are implementing the project. The remaining three states/UTs Goa, Meghalaya and Lakshadeep are likely to join in the third cycle.

5.5 POPULATION EDUCATION RESEARCH (1981-1990)

Need to take stock of researches conducted in the area of population education by preparing inventories was felt, even before the NPEP Project took off in 1980. A monograph titled "A Decade of Population Education Research in India" was brought out by NCERT, covering research conducted during 1970-80. One of the important findings, which surfaced, is that there are no studies related to the teaching-learning process involved either in population education or on the training needs of personnel in the field of population education.

Inventory and Analysis of Research Studies by NCERT

An inventory titled "Population Education Research in India (1981-90) -Inventory and Analysis" has been brought out by NCERT. It was done at the instance of UNESCO Regional Office, Bangkok.

It reveals that 86 research studies have been included and are classified under five sections:

Basic Research Studies	40 Studies Category 1; Demographic factors and fertility : 25 Category 2; Studies on development aspects : 6 Category 3; Studies on special groups : 9
Knowledge, Attitude Practice (KAP) studies	21 studies
Studies on Curriculum Development and Instructional Material	7 studies
Studies on Teaching Methodology	3 studies
Studies on Programme on Impact Evaluation	15 studies

The following are the main findings of the research studies. However, the limitations of these studies are that the samples are small and do not cover the entire nation.

Findings of Basic Research Studies

(1) Lower age at marriage, lower educational level and lower income status are generally seen to be directly correlated with high fertility and mortality.

(2) There is a positive correlation between the income and fertility levels.

(3) The fertility is higher among the Backward and Scheduled Caste people who are socially and economically weaker sections of the society.

(4) Preference for the male child is a common phenomenon.

(5) In one of the studies, the findings were that fertility is lower among illiterate females than it is among females with primary education. Among the higher educated females, the fertility is found to have declined.

(6) Rise in age at marriage can help reduce fertility.

(7) Educational qualifications of both father and mother have been found to have a positive effect on the development of talent among children.

(8) The total marital fertility rate of "modern couples" both in rural and urban areas is much lower than that of "traditional couples" or when either of the spouses is modern.

(9) The practice of family planning is found to be 94% among "modern couples" as compared to 21% among "traditional couples".

(10) The socio-economic variables such as education, income and occupation are rather weakly associated with fertility.

(11) The scheduled tribes are found to have high fertility, largely reinforced and accompanied by their low age at marriage, early child bearing and excessive child-loss phenomenon.

(12) Scheduled caste couples have smaller families, lower birth order, lesser proportion of infants and a lower birth rate as compared to the scheduled tribes.

Findings of KAP Studies

(13) In one study, 45% of primary school teachers and 31% of secondary school teachers out of a total sample of 300 teachers showed a favourable attitude towards delayed marriage, female teachers being slightly larger in number.

(14) A majority of students are in favour of small families.

(15) In one study, students from non-professional colleges are found to have better attitude towards population related issues than their counter-parts in the professional institutions.

(16) A significant difference in attitude towards delayed age at marriage is observed among students from professional and non-professional colleges in another study. However in this study, the professional students are found to be comparatively more in favour of delayed marriage.

(17) The teachers working in private schools showed a better understanding of the concept and content of population education.

(18) Teachers belonging to Hindu and Christian religions are found to be more favourable to the introduction of sex education in secondary schools than those belonging to Islam.

(19) Science teachers are more favourable for the introduction of sex education in schools than Art teachers.

Findings of Curriculum Development and Instructional Materials

(20) Population education contents are found to be integrated into different school subjects.

(21) The integration into textbooks has been found to be generally functional, though there is still wide scope for improvement.

(22) Integrated content of population education is more in science subjects than in social science subjects.

Findings of Teaching Methodologies

(23) Self-learning and peer group approaches are found to be more suitable to students living in the urban areas.

(24) The mass media approach is found to be comparatively more beneficial to urban boys, whereas the self-learning approach is found to be relatively more helpful to rural boys and urban girls.

(25) The infusion approach has facilitated the integration of knowledge and understanding among students.

(26) An inverse relationship exists between the family size and students' academic achievement.

(27) The impact of introducing population education concepts in biology lessons on the performance level of students is found to be positive.

Findings of Programme Impact Evaluation

(28) In all the studies, in-service teacher training programmes in population education are found to be effective in creating among trainees the necessary awareness of population related issues.

(29) It has generally been found that urban students show better achievement and awareness of population related issues than their counterparts in the rural areas.

(30) In one study it is revealed that the population education programme has an average impact in terms of improving students' awareness.

The following are the shortcomings noticed in the area of research in Population Education:

(a) Among the 86 research studies in the area of population education, no research has been done in the area of management and supervision and information dissemination.

(b) In the area of impact evaluation, there is hardly any study, which has gone to the grassroot level, like classroom situation to probe the impact of teacher training programmes.

(c) The impact of population education teaching in students has not been examined in terms of behavioral changes that are supposed to occur when they are grown into adults.

(d) One of the studies testified to dilution in depth of training/orientation courses, wherever downward decentralisation policy had been pursued.

5.6 EMERGING ISSUES AND TRENDS IN POPULATION EDUCATION

Population education draws its contents from demography, human ecology, family life education or sex education. Depending upon the socio-economic and cultural factors of each country, the content or the central approach varies. For example, in developed countries like the USA, the content areas stress consumption and pollution rather than birth rates. In Latin America, the different aspects of family life and sex education are most pronounced. In India, the demographic and development link-up has taken importance with its adverse effect of population growth on developmental activities of the country and stresses on a small family norm. The Philippines, Thailand and China have population education programmes incorporating large contents of family life and sex education. Vietnam has the sex education programme separately, supporting the population education programme. Malaysia has family life education programme.

In most Pacific countries, there is higher incidence of adolescent fertility related problems than in Asian countries and has widespread Acquired Immuno Deficiency Syndrome (AIDS). Since this disease is not yet curable and prevention is the only solution, there is a need of preventive education in AIDS, before AIDS attains epidemic proportion.

The premarital sexual activity, teenage pregnancies, illegal abortions and illegitimate births are on increase with the onset of early puberty in girls, due to the result of improved health and nutrition. The increasing age at marriage of girls to decrease the reproductive rates in girls is becoming counter- productive.

As per the estimation of the Population Reference Bureau, 40% of the people in developing countries are under the age of 15 years and 60% of the people are under the age of 25 years. It was estimated that 13 million births occur to adolescents every year. This is projected to be 75 million in the developing countries by the year 2020,

Thus there is a growing concern in the several countries to include sex education or adolescent fertility in population education.

Family Life Education

There is a great concern in Asian developing countries that the traditional family values are getting eroded due to modernization and liberalised codes of sexual ethics. The family, which is the basic institution of mankind, is crumbling down. It is necessary to bring a better understanding of the physical and emotional changes associated with growing up. To achieve this, a personal relationship with friends, family and society is essential. Developing values and skills for successful marriage, child bearing, bringing up children and developing a cohesive family is a prerequisite. To achieve the above objectives, many countries want to introduce family life education as a part and parcel of population education.

Aging of the Population

As a result of improved health care, control of diseases and better living conditions, nowadays people are living longer. The increase in the older age group has a corresponding increase on the need for medical, housing, economic and other social services. The Asian traditional values to look upon elderly people with respect and care, use their experience to improve their own quality of life and take care of them in their old age have all been eroding slowly and causing concern to the society and the government.

The United Nations forecasts (Research Developmental Journal, Vol-2, No.1, 1995) that elderly people will increase more rapidly in Latin America and South East Asia than in North America, both in the percentage terms and also in aggregate. Over the period of 1980-2020, it is anticipated that the number of people over 80 years old will increase by 90% in Europe and Northern America, 405% in South America and 408 % in South- east Asia. In the Indian context, 25 million people who are aged 60 to 69 and above in 1980 will be 83 million and 53 million respectively in the year 2020 A.D. and the majority will be in rural areas.

Such growth would tax the resources of the nation and, in India, it will create one more social problem.

Drug Abuse

The growing incidence of adolescents becoming victim to drug abuse is another major concern.

In the context of the above concerns of the adolescents, the concept of adolescent education has emerged. In the Indian context, the major components of adolescence education are:

(a) Process of growing up.

(b) AIDS.

(c) Drug abuse.

New Trends in Population Education

The feedback received through the inbuilt monitoring mechanisms of the NPEP project in India and the findings of the NCERT through its inventory and analysis on Population Research in India (1981-1990) provided insight into the limitations of the state of institutionalisation of Population Education in school education. It was realised that the existing conceptual framework of Population Education had the following limitations: "(a) It did not provide comprehensive treatment to the unfolding dimensions of inter-relationship between population and development; (b) its theoretical framework was not in tune with the existing framework of national curriculum of school education in India."[46]

The population framework adopted by NPEP in India did not include sex-related matters, which were very critical in influencing the fertility behaviour of persons. The absence of sex related matters in population education curriculum work has been all the more pronounced with the advent of HIV / AIDS, which is attaining epidemic proportion among adolescents.

Another important limitation of the existing conceptual framework of population education is in its approach. It is directional and message oriented and therefore not suitable to the existing open ended curriculum framework of school and non-formal education.

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[46] NCERT, *Population Education — A Reconceptualised Framework*, Population Education Bulletin, July 1986, p.2)

In view of the above and also in the advent of new emerging trends in population education, which became clear after the conferences at Istanbul 1993 and Cairo in 1994, a need has arisen to reconceptualise population education.

The recommendations of the conferences stress the need:

(a) To bring changes in demographic behaviour with free and active participation of men and women (reproductive and sexual health).

(b) To achieve environmentally sustainable population (inter connection of population and environment).

Reproductive and Sexual Health

The conference documents stress reproductive health for both men and women. Reproductive health care is defined to mean access to a wide range of methods and techniques for the regulation of fertility, which contributes to reproductive health problem. This also includes having a satisfying safe sex life and capability to reproduce and freedom to decide when and how often to do so.

The Inter-connection of Population and Environment

There is a direct nexus between the growth of population and the depletion of resources. The awareness of this knowledge in our people is lacking and, as such, forests are cleared for cultivation and energy. The lifeline rivers are polluted and forest areas are devastated. Due to deforestation, our wild life is in peril and ecological imbalance is created.

In the developing countries, if the degradation is brought about by the increase in the population, the less populated developed countries, due to their affluent style and over consumption, are equally polluting the environment. A better balance has to be struck between the development potentials and environmental concerns on one hand and population growth rate and its distribution on the other, for achieving real and lasting development and population stabilisation at an earlier date than it is envisaged. As S. P. Godrej puts it, development, environment and population constitute a Trinity.

In view of these considerations, the existing framework is being reconceptualised to include the following elements:

(a) "Family Life: Structure and role of Family Basic Needs, Shared Rights and Responsibilities, Responsible Parenthood, the Girl Child and the Female Members — their prime place.

(b) Gender Equality and Equity: Education, Health Care and Employment Opportunities Outside Home for Women, Reproductive Rights and Reproductive Health, Male Responsibilities.

(c) Adolescents and Reproductive Health: Process of Growing up, Sexual Health and STDs, HIV/AIDS and Drug Abuse.

(d) Health and Education: Health, Nutrition and Population, Infant Child and Maternal Health, Safe Motherhood, Literacy and Female Literacy.

(e) Sustainable Development: Population situation, sustained economic growth, consumption, resource development, population, resources, technology, environment and development

(f) Urbanisation and Migration: Population distribution, future directions and internal and international migration."[47]

5.7 INSTITUTIONALISATION OF POPULATION EDUCATION

The ultimate objective of NPEP is to institutionalize population education in the educational system. This involves: (a) making population education an integral part of the curriculum at all levels of education, non-formal education and adult education, (b) including population education as one of the areas of study in teacher training programme, and (c) including population education as an examination subject.

To achieve this objective, necessary administrative infrastructures were created and various activities were initiated such as framing the curriculum and syllabus, developing text books and other instruction material, integrating population education elements in different subjects at suitable plug points, training project functionaries and teachers, developing relevant co-curricular activities and evaluating the project at different stages. These activities were spread out during both the cycles. However, the main focus during the first cycle was on the expansion of the project to cover students, teachers and other education functionaries of primary, upper primary, secondary and teacher training colleges. During the second cycle, the emphasis was on consolidation of the project activities, expansion of the project to senior secondary level and non-formal education, and research.

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[47] Ibid.

In spite of these activities, the goal of institutionalization was a far cry. The NPEP programme was, therefore extended to its third cycle, to co-terminate with the 8th five-year plan.

In order to identify the gaps and discrepancies during the second cycle, a detailed action plan was developed to identify and include new thrust areas and to make the population education curriculum more relevant. A workshop on Needs Assessment was organised at NCERT in 1990.

The problems identified in this workshop were as follows:

(a) The frequent transfer of trained project personnel.

(b) The states finding difficulty in coordinating work with the authorities responsible for framing syllabus and preparing the text books.

(c) The states facing difficulties in co-ordinating the syllabus at the senior secondary stage and Secondary Teachers Training Colleges as they come under the jurisdiction of different heads, Board of Secondary Education and University, respectively.

(d) The states finding difficulty in distributing the instruction material to the target groups for want of technical manpower needed to translate those materials into the regional languages.

(e) Problem posed by a large amount of teachers needing to be trained in a short time.

(f) No weightage given in the education system, in spite of effective co-curricular work.

(g) Lack of research support.

Proposals of NPEP During the Third Cycle

The National Population Education Project entered the third cycle (1992-1995). The UNFPA's contribution is estimated to be the tune of $ 2.87 million, whereas the central and state government inputs would be about Rs.43.2 million.[48] The major components of this programme in the third cycle are:

(a) At the non-formal sector, efforts will be directed towards the better coordination of the non-formal section of NCERT with the help of ongoing projects like Comprehensive Access to Primary Education (CAPE) and other developmental agencies, voluntary agencies, Panchayat Raj Institutions and the network available under the government will be utilised.

(b) The village adoption programme will be increased, ensuring more community participation in the area of population education, keeping in mind the needs of girls, scheduled castes and scheduled tribes.

(c) The reorientation of content of population education in syllabi, textbooks and other instruction material will be another activity. At the same time, concerted efforts will be made to promote population education as a separate subject of study at various levels of schooling.

(d) The core packages, which have been evolved at the centre, will be translated into regional languages to ensure their adaptation and maximum utilization at state level.

(e) The backlog of teachers will be cleared under in-service teacher training.

(f) The DIET and CTE, which are the centres of pre-service and in-service training programmes of teachers at primary and secondary school levels, and also NCTE, will be effectively linked up with NPEP to promote the objectives of Population Education.

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[48] NCERT, *NPEP Enters the Third Cycle, Population Education Bulletin*, Jan. 1992: 2: 1 x 2

(g) Efforts will be made to introduce population education as one of the elective papers at B.Ed and M.Ed level, apart from having population education as one of the elective subjects.

(h) The co-curricular activities will be made an integral part of the school programmes to ensure wider participation.

(i) Efforts will be made to produce more and more A.V. software in the form of lessons and discussions on population education for different target groups and the Indian Communication Satellite will be employed for wider dissipation.

(j) The document centre at NCERT will be strengthened to perform the clearinghouse activities effectively.

(k) The test for measuring awareness and attitudes for different target groups will be standardized.

(l) Special activities will be taken up with regard to emerging concerns such as adolescent education, old age and AIDS.

(m) Efforts will be made to encourage research in the thrust areas, promote research through funding and promote applied research to improve the quality of various project activities.

Present Status

Evaluation studies of NPEP conducted during the third cycle (1992-1997), revealed that the population elements have been integrated in substantial measure in the syllabi and selected subject text books of all school stages and in pre-service elementary teacher training programmes. About two million of key and resource persons, teachers and teacher educators have been oriented in population education. Various co-curricular activities that were held frequently, involving thousands of teachers and students have provided them an intensive exposure to critical population issues. However, two vital considerations:

(1) The gaps in the instituionalization of population education have to be bridged — the elements relating to themes such as Responsible Parenthood and population related Values and Beliefs have not been reflected well in the primary and upper

primary text books, while, element of adolescent reproductive health did not get entry into syllabi of secondary school at all.

(2) Adopt the Programme of Action in the light of International Conference of Population Development held in Cairo, 1994 have compelled to carry forward the population education programme to the fourth cycle during the 9th five year plan (1995-2001), as the Project on Population and Development in Schools. (PPDES).

"The long term objectives are:

(1) To instituionalize the Post-ICPD Reconceptualised Population Education in the education system.

(2) To develop awareness and positive attitude towards population and development issues leading to responsible behaviour among students and teachers and, indirectly among parents and the community.

(3) To create awareness about adolescent reproductive health among students, teachers and parents and develop in them healthy attitude towards sex and members of the opposite sex.

(4) To contribute to the realisation of India' demographic and health goals which affect the overall development of the country.

The major thrust areas are:

(1) Integration of elements of post-ICPD population Education in the content and process of school education and teacher education.

(2) Introduction of Adolescence Education containing elements of Adolescent Reroductive Health in school education and teacher education."

(*Source:* Population Education Bulletin, Vol. 7. No. 1 and 2 January, 1998 NCERT).

5.8 FEMALE LITERACY AND POPULATION GROWTH

Reduction of Fertility

Female literacy leads to declining fertility trends and encourages late marriages. This has been proved in the developed countries and also in our Asian neighbours, South Korea, Taiwan, Hongkong, Singapore, Malaysia, Thailand and Indonesia. These countries have high rate of literacy, especially female literacy, and have stabilised their population.

Indonesia and India became independent roughly around 1947. Indonesia's literacy at that time was 12% and India's was 22%. Today the literacy of Indonesia has increased to 80%, whereas India's literacy is a little over 50% and our illiterate population of 492 million consists mainly of women.

A study conducted by the office of the Registrar General, India, and the East West Population Institute examined the relationship between female literacy rate and total fertility rate (TFR) which is defined as the average number of children a woman would have during her life, given current birth rates. The study included 326 districts of the major states of India and covered 90% of the country's total population. It was found that the number of children per woman was considerably lower in the districts where high population of women is literate than in the districts with lower literacy level. The higher the literacy rate among woman, the lower was the infant mortality rate which in turn contributed to the lower fertility rate.[49]

It is apparent, from the table V(viii), that the higher the female literacy, lower is the fertility and lower infant mortality and, conversely, the lower the female literacy rate, the higher is the fertility rate and higher infant mortality rate.

This proves that female literacy has a direct bearing on the fertility rate and thereby on the growth rate of population.

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[49] *Population Education Bulletin, 2: No. 1 & 2, January 1992*, Asia Pacific Population and Policy, No. 15, Dec. 1990.

Table V(vii): The table below indicates the fertility pattern in 18 states of India during the period 1971-1991.

	Total			*Rural*			*Urban*		
Region/state	*1971*	*1981*	*1991*	*1971*	*1981*	*1991*	*1971*	*1981*	*1991*
India	5.2	4.5	3.7	5.5	4.8	4.4	4.2	3.4	2.7
North									
Bihar	—	5.7	4.6	—	5.8		4.7	4.8	3.4
Madhya Pradesh	5.7	5.2	4.6	6.0	5.5	4.9	4.5	4.0	3.3
Rajasthan	6.3	5.4	4.5	6.4	5.6	4.8	5.4	4.4	3.5
U.P	6.7	5.8	5.2	6.9	6.1	5.5	4.9	4.2	3.8
East/N.E									
Assam	5.5	4.1	3.4	5.6	4.2	3.6	4.1	2.6	2.1
Orissa	4.8	4.2	3.3	4.9	4.3	3.4	4.3	3.7	2.4
West Bengal	—	4.2	3.2	—	4.8	3.8	—	2.5	2.0
South									
A.P	4.7	3.9	3.0	4.9	4.1	3.1	4.2	3.0	2.5
Karnataka	4.4	3.6	3.1	4.7	3.8	3.3	3.5	2.9	2.5
Kerala	4.1	2.9	1.8	4.1	2.9	1.9	3.7	2.5	1.8
T.N	3.9	3.4	2.2	4.2	3.7	2.4	3.1	2.8	2.0
West									
Goa	—	—	1.9	—	—	2.0	—	—	1.8
Gujarat	5.7	4.4	3.2	6.0	4.7	3.4	4.6	3.6	2.9
Maharashtra	4.5	3.7	3.0	4.7	4.0	3.4	3.9	3.0	2.5
North West									
Haryana	6.4	5.0	3.9	6.8	5.3	4.2	4.4	3.7	2.9
H.P.	4.7	4.0	3.1	4.8	3.7	3.3	3.1	2.3	2.2
J&K	4.8	4.4	3.3	5.2	4.9	3.5	3.1	2.7	2.5
Punjab	5.3	4.0	3.1	5.6	4.1	3.4	4.4	3.4	2.8

(*Source:* Estimates based on the Sample Registration System and (for Goa) the 1992-1993, National Family Health Survey).

TABLE V(viii): Growth Rate, Female Literacy Rate, Fertility Rates and Infant Mortality for Developed and Backward States as per 1991 Census

States	*Growth Rate*	*Female Literacy Rate*	*Urban fertility Rate*	*Rural Fertility Rate*	*Infant Mortality*
Kerala	1.21%	86.17%	1.8	1.9	17
Tamil Nadu	1.19%	51.33%	2.0	2.4	57
Goa	0.93%	67.09%	1.8	2.0	—
Bihar	2.07%	23%	3.4	4.7	69
M.P	—	28%	3.3	4.9	—
U.P	2.4%	6%	3.8	5.5	93
Rajasthan	—	21%	3.5	4.8	—

Religion, Caste Differences and Growth Rates

Muslim women tend to have higher fertility rate than Hindu women. This has been found by the National Family Health Survey (NFHS) of 1992-93 in 13 of the 14 states except in Tamil Nadu where the fertility of women in both the communities is the same. (Refer Table V (ix)).

The less advantaged scheduled castes and schedules tribes have higher fertility rate than others. (Refer Table V (ix)).

Table V(ix): Religious and Caste Differences in Fertility in Selected States of India, 1990-1992.

	Total Fertility Rate					
	Religion			*Caste*		
State	*Hindu*	*Muslim*	*Other*	*Scheduled Caste*	*Scheduled Tribe*	*Other*
Andhra Pradesh	2.6	2.9	1.7[a]	2.6	3.7	2.5
Assam	2.9	5.0	4.8[a]	2.8	3.7	3.5
Gujarat	3.0	3.3	3.0	3.0	3.3	2.9
Goa	1.9	2.2	1.9[a]	3.8	2.7	1.8
Haryana	3.9	6.9	3.9[b]	4.6	—	3.8
Himachal Pradesh	2.9	4.8	4.4[b]	3.1	4.2	2.9

(Table V(ix) Cont.)

(Table V(ix) Cont.)

	Total Fertility Rate					
	Religion			*Caste*		
State	*Hindu*	*Muslim*	*Other*	*Scheduled Caste*	*Scheduled Tribe*	*Other*
Karnataka	2.7	3.9	1.5	3.2	2.2	2.9
Kerala	1.7	3.0	1.8[a]	1.1	1.1	1.9
Madhya Pradesh	3.9	[illegible]	2.6	4.7	4.1	3.8
Maharashtra	2.7	[illegible]	[illegible]	3.0	3.2	2.8
Orissa	2.9	[illegible]	3.4[a]	3.7	2.9	2.8
Rajasthan	3.7	4.0	3.4[b]	4.3	3.9	3.9
Tamil Nadu	2.5	2.5	2.7[a]	2.8	—	2.4
Uttar Pradesh	4.8	5.3	3.4	5.6	5.9	4.7

— Not available , Christian [a] , Sikh [b]

(*Source:* Individual state reports from the 1992-1993 National Family Health Survey).

Table V(x): The following table gives the literacy rate of the different religious groups and their growth rates.

	-Female Literacy	*Graduate*	*Growth Rate*
Hindus	54.8%	7.9%	22.78%
Muslims	40.5%	2.3%	32.76%
Christians	77.3%	8.1%	16.89%

(*Sources:* National Sample Survey of 1987; (Indian Express December 10, 1995)

Urban Versus Rural Areas

According to the 1991 Census, urban areas maintain a lead over rural areas both in literacy and level of education. The percentage of illiteracy among rural women is twice as high as in urban area women. The percentage of females who have completed high school education is 4% in rural areas compared to 22% in urban areas.

Education and Marriage

The women in the four northern states of Bihar, M.P., U.P and Rajasthan, where the literacy rate of women is low, marry at a very young age. More than 60% of women marry below the age of 20 and

90% of women marry before reaching the age of 25. In Kerala, where the literacy rate of women is high, less than 80% of women in the age group of 25 & 30 get married. The low marriage age of girls in the northern states increases the fertility rate. This gives rise to increased maternal and infant mortality rate, due to high rate of child bearing and poor health facilities. The late marriages are associated with high fertility decline and also infant mortality decline, which brings down the desire for more children.

Education and Population Stabilisation

The decline of infant mortality or the child survival rate depends on the health state of mother and nutritional aspects of mother and child, which have a bearing on economic status. The eradication of poverty and the overall development in, improving the quality of life are, therefore, seen as the best contraceptives for population stabilisation.

5.9 POSITIVE TRENDS TOWARDS POPULATION STABILISATION

Several heartening indicators are emerging towards population stabilization. The following table gives the percentage of literates in India from 1951-1992:

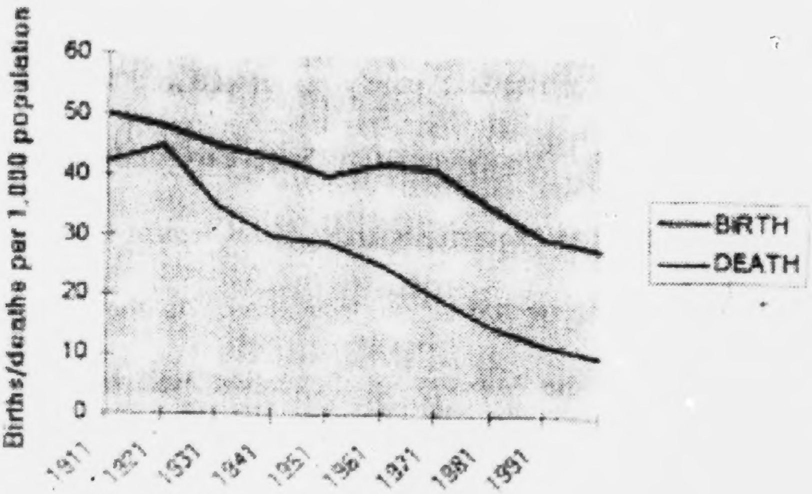
TABLE V(xi): Table showing percentage of literates in India from 1951-1992.

Year	*Total* %	*Male Literate %*	*Female Literate %*
1951	16.7	25.00	7.9
1961	24.0	34.40	13.0
1971	29.5	39.5	18.7
1981	36.2	46.9	24.8
1991	52.21	64.13	39.29
1992	57.0	69.0	43.0

From the table one can infer that the percentage of female literacy is always lower than the percentage of male literacy. But there has been

Fig. 5.1

Trends in Birth Rate, Mortality Rate and Natural Increase in India, 1911-1993



a gradual increase in the percentage of literacy in both men and women from 1951 to 1992.

Table V(xii): Mortality Indicators by Rural-Urban Residence:India, 1971-93

	Crude Death Rates			*Infant Mortality Rates*			*Life Expectancy at Birth (yrs.)*		
Year	*All*	*Rural*	*Urban*	*All*	*Rural*	*Urban*	*All*	*Rural*	*Urban*
1971-1975	15.5	17.1	9.8	134	144	83	49.7	50.5	49.0
1976-1980	13.8	15.0	8.9	124	134	74	52.3	52.5	52.1
1981-1985	11.0	11.9	7.5	90	98	56	55.5	55.4	55.7
1986-1990	10.6	11.6	7.3	91	99	59	57.7	57.7	58.1
1991	9.8	10.6	7.1	80	87	53	59.2	59.0	59.4
1992	10.1	10.9	7.0	79	85	53	—	—	—
1993	9.2	10.5	5.7	74	82	45	—	—	—

Annual Death per 1,000 population[a], Annual deaths to children under age per 1,000 live births[b] Life expectation is for 1990-92.

— Not available

Source: Sample Registration System, and (for life expectancy) Census of India, Occasional Papers No.1 of 1985, 1989 and 1994, " SRS-Based Abridged Life Table" (New Delhi Office of the Registrar General, 1985, 1989, 1994).

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Fig.5.1 shows that the birth rate declined more slowly than the death rate between the years 1921 and 1971. The birth rate, which was 40 in 1951, fell to 28 in 1993. There is a steady decline in mortality rate also from 1951 onwards. The death rate, which was 27 in 1951, fell to 9 in 1993.

As a consequence of lower mortality rate, life expectancy of Indians has increased from 32 years in 1940 to 50 years in 1971 and almost 60 years in 1991. But India's life expectancy is still below the average for all developing countries which was 64 years in 1995 (Table V (xii)).

The total fertility rate which was about 6 children per woman till 1966 fell to about 3.4 children in 1990 as per NFHS Report, 1992-93. For rural women the fertility rate is little more than that for urban women.

The average marriage age for girls, which was 16.1 in 1971, has gone up to 20 years in1992, which has also contributed to fertility decline.

The percentage -of women in the age group of 15-44 using contraceptives increased from 13 to 40 between 1970-1993.

India's impressive gains in bringing down the infant and maternal mortality rate can be attributed to the introduction of welfare programmes like nutrition, health and education, the role of mass media in bringing about awareness among people, availability of family planning facilities, women's education, and introduction of Population Education in the education system.

5.10 SUMMARY

To sum up, the Population Education programme, which was conceived during the late 1960s as an intervention strategy for family planning, was introduced in the education system in India with the assistance of UNESCO and UNFPA. The education programme was introduced at all levels of school education through the project NPEP during the 80s. Initially, Population Education, which emerged as a demographic laden concept, had to be modified to a value-laden concept,

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emphasising the personal aspects such as family size, family welfare, delayed marriage, responsible parenthood, population change and resource development, population related values and beliefs and status of women. Research studies, conducted after the second cycle of NPEP, have brought out the strengths and weaknesses of the programme. In the light of the emerging issues and trends such as family life, gender equality and equity, adolescent and reproductive health, health and education, sustainable development, urbanisation, and migration, the population education programme is in the process of reconceptualisation once again. The positive trends observed towards stabilisation of population are largely attributable to the population education programmes in schools.

• • •

CHAPTER VI

IMPACT OF INTERNATIONAL CO-OPERATION

6.1 FINDINGS

Teacher Education

The following findings emerged from the analysis of data gathered on teacher education:

1. The National Education Policy has been shaped and evolved from the contributions of educationists, subject specialists, educational administrators from developed countries and technical assistance from international organisations like UNESCO, UNDP and non-governmental organisations such as Ford Foundation and Rockfeller Foundation.

2. The UGC and NCERT jointly organised Summer Institute programmes in science and mathematics with the collaboration of USAID and National Science Foundation, Consultant from four distinguished Universities of USA. By 1972, a total of 353 Summer Institutes were conducted, covering 13700 teachers, after which the NCERT took over the activity for five more years. The Summer Institute had contributed to the subject matter competency of teachers and teacher educators and exposed them to the latest development in science and exchange of ideas.

UGC has instituted many national fellowships, teacher fellowships and travel grants for teacher educators for attending international seminars and conferences.

3. (a) The NCERT, with its comprehensive infrastructure, has been giving leadership in the fields of school education and teacher education. It has links with many international bodies like UNESCO, UNICEF, UNFPA and UNDP, and has been their implementing agency for the projects in India, supported technically and financially by them. NCERT is a national associated centre of APEID programmes and takes part in all its co-operative regional activities. It renders its help to many other developing countries in school education. NCERT's strongest thrust is in the area of curriculum development. During the 60s, 70s and 80s, it worked very closely with teachers, pedagogists, curriculum experts, subject experts and authors in developing a curriculum, which conforms to national goals and philosophy and yet is flexible enough to adapt to local needs and environmental conditions.

(b) The NCERT functions through its main organs like NIE, RCEs, CIET and Field Offices.

(c) The Department of Teacher Education is a part of NIE. NIE was established with P.L.480 funds of USA. The major impact of American education has come through this organisation. This department has devised a number of programmes to update the teachers with new innovations in teacher education such as developing programme for microteaching technique, research studies in the integration of skills during the process of teaching, developing books in research methodology, developing and publishing reading materials for teacher educators in the areas of student teaching and evaluation of student teachers, conducting orientation courses in microteaching and models of teaching. One of the important activities undertaken, is the development of context specific strategies for education of disabled children under the UNICEF assisted project like Project Integrated Education for the Disabled (PIED).

4. (a) The Regional College of Education Programme, perhaps the most significant in terms of international co-operation, was started to produce teachers in the diversified courses for multi-purpose schools. The programme lost its bearing when the multipurpose school concept was abandoned. Though it was planned to introduce the four year integrated course in science, technology, commerce,. and agriculture, the course in agriculture did not take off at all in any of the RCEs, while courses in science and technology started in all the four RCEs and the course in commerce started only in RCEs at Mysore and Bhopal.

(b) The four-year integrated course, which trains a teacher both in content and pedagogy, though considered to be more effective then the traditional one-year course, has not been popular enough for its wide-spread replication in other universities across the country.

(c) After the project period 1964-69, the programmes in RCEs underwent frequent changes, except for the four year integrated course in science, which is still on, in all the four RCEs. The two year M.Sc.Ed., the first of its kind in the country, has been introduced in RCEs. The Summer School cum Correspondence Programme for clearing the backlog of untrained-teachers and the Correspondence cum Contact Course for improving the qualification of teachers, a one-year teacher training programme, B.Ed (Ele.) for primary teacher educators are important contributions of RCEs.

(d) RCEs are involved in developing instructional materials for the use of teacher educators, teachers and trainees, conducting training and extension activities for teachers and teacher educators, researching into problems of education and teacher education, implementing innovative programmes of pre-service and in-service education and collaborating with state governments to improve teacher education programmes.

(e) The critical study and analysis of RCE projects carried out by the Ohio State University in 1970 revealed that the teachers trained in RCEs are competent and dedicated.

5. The National Council of Teacher Education (NCTE), an apex body responsible for the formulation of policies for Teacher Education programmes at all levels of education and for the maintenance of high standards of teacher education, has close linkages with various educational agencies both national and international. It conducts academic programmes such as curriculum development, preparation of curricular materials, admission policy and evaluation through workshops, seminars, orientation programmes and meetings of working groups and expert groups.

NCTE has developed a draft code of professional ethics for teachers, which has been widely discussed and is being implemented. It has developed tools to measure the accountability and the social and professional responsibilities of teachers, which are still to be standardised by means of project studies. It brings out the 'NCTE Bulletin', a quarterly journal to stimulate teacher education activity, generate innovation and facilitate exchange of information on all aspects of teacher education.

The NCTE is working for the closure of Correspondence cum Contact Courses, which have fallen into disrepute due to malpractice.

6. NIEPA has emphasised research backed policy planning, project formulation and management.

So far, 250 officers from various parts of India and 160 foreign nationals from 40 countries have participated in the national / international diploma programmes.

NIEPA's Action Research on Implementation Strategies for Education (ARISE), which was undertaken to promote enrolment and retention of children in school, serves as a laboratory in micro level planning and management.

7. AITE offered a nine months course for educators deputed by Asian Governments, which was later converted into two shorter four months courses. It gives consultancy services to the national level institutes, assists national level teacher training institutions to disseminate their new ideas and practices in teacher education; conducts comparative studies in the curriculum and methods of teacher education, and provides training in research. AITE organises subregional seminars in selected countries to make it possible for a large number of associate institutes to keep abreast of the most recent educational concepts and techniques. AITE's important contribution is encouragement to the Asian Regional States to set up their own courses for teacher educators, which some of the countries did. In

India. AITE influenced NCERT in contributing to the professional development of teachers through its Department of Teacher Education.

8. The adoption of microteaching is a need-based innovation in teacher education, which has been substantially institutionalised in teacher education. A body of research based knowledge has been developed and validated.

9. Models of Teaching is an educational innovation in teaching technique, which helps teachers and curriculum makers with a range of approaches to create interactive environment for learning. The Models have exposed teachers to different strategies of teaching and have motivated teacher educators in India to do pioneering research. Models of teaching are introduced at B.Ed., M.Ed., M. Phil. levels in most of the teachers' colleges. It has been found that the Concept Attainment Model, the Advance Organiser Model and the Inquiry Training Model are particularly suitable to Indian classroom teaching.

10. APEID succeeded in helping to develop high level commitment to educational change, in providing institutional collaboration and in generating significant innovations in teacher education. APEID's projects are designed and developed according to local needs. The expertise and experience gained through project implementation are shared widely.

APEID has identified 10 mega trends in curricular reform, which have substantial implications for the development of new teacher competencies and has also identified the specific competencies needed for a teacher. The 10 mega trends in curriculum reform are: (a) Education for all; (b) Relevance of the curriculum to the individual and society; (d) Development of appropriate values and attitudes; (e) Development of process skills; (f) Concern with meeting the needs of the whole individual; (g) Maximising the full potential of each child, irrespective of socio-economic status; (h) Learner centred learning and teaching; (i) Mastering learning; (j) Holistic performance evaluation; (x) Coping with and/or managing change.

11. The flow of international co-operation which was substantial during the 50s and 60s has now trickled down as the flow of international co-operation in education has diminished in recent years for a number of reasons, such as the inability or unwillingness of the borrowing agencies to commit resources toward the continued implementation of projects and programmes needed to supplement external assistance, the development of local resources and competence in response to the need of eventual self-sufficiency in all matters of national development and the changing relationships among borrowing and lending nations for political and strategic reasons and their impact on foreign policy.

12. The State level units like SIEs, SISEs, SCERTs, SBEs, DIETs, CTEs and Institutes of Advanced Studies, which are outfalls of NCERT, are providing physical infrastructures for achieving their objectives. But very little attention is being paid to developing the skills and quality of personnel manning these institutions.

Science Education

The following findings emerged from the analysis of data gathered on Science Education

1. From 1955 to 1960, under the "Project Strengthening of Science Education", Ford Foundation assisted in (a) establishing extension centres in the training institutions to provide in-service training in science through seminars, workshops, conferences and exhibitions; (b) establishing science clubs; (c) deputing science teachers to USA, UK, and Canada with the collaboration of USEFI, British Council and Canadian High Commission.

2. The establishment of the Indian Parliamentary Scientific Committee (1961) gave an impetus to the re-orientation, improvement and expansion of science education. The committee strongly recommended the modernisation of science curriculum on the pattern of courses introduced in some of the advanced countries like UK, USA and USSR, Japan, Germany and France and laid stress on preparing instructional materials on the lines of those prepared by the physical science committee of USA.

3. During the years 1962-63, the establishment in NIE of (a) the Department of Science and Maths education and (b) the Central Workshop to produce prototype school equipment and low cost kits for primary and middle school stage with the assistance of UNESCO/ UNICEF in the form of experts, fellowships and funds is a landmark in the development of science education.

4. During the third five year plan (1960-65), State Institutes of Science Education (SISE) were set up in all the states, for planning and implementing improved programmes in all aspects of science.

5. In 1963, the UNESCO Planning Mission, at the request of the Indian government, made an in-depth study of the existing status of science and maths in India and gave a comprehensive report with suggestions for improvement and implementation. One of the major recommendations was the abolition of general science for middle schools and the introduction of Physics and Elements of Biology in Class VI, Physics, Chemistry and Zoology in Class VII, Physics, Chemistry, Anatomy and Physiology in Class VIII (Variant I).

6. The National Education Commission (1964-66) recommended the introduction of science as a different discipline from Class V onwards, introducing in Class V - Physics, Geology, Biology; Class VI - Physics, Chemistry, Biology; Class VII- Physics, Biology, Chemistry and Astronomy (Variant II).

7. During the years 1963 - 1972, UGC and NCERT under the USAID contract conducted 292 Summer Institutes in Science. 11,300 teachers participated in them. These Summer Institutes introduced Secondary School Teachers to new developments in science and new techniques of teaching science and demonstrations, which were developed in USA during 1950's. This led to the adaptation of American Science material to Indian needs and the adaptation project was also funded by USAID.

8. Experts from UNESCO and USSR guided and participated in the development of the project 'Secondary Science Teaching' (SSTP). 49 Indian Science educationists from NCERT were trained in various institutions in USSR in different aspects of science curriculum development, pre-service and in-service programmes of science teachers. Under this programme, the central workshop produced science kits, laboratory on wheels to take science to villages, which helped in spreading scientific knowledge among rural adults, enriching the knowledge of teachers in rural areas. The curriculum material produced under this programme was tried out in 30 selected schools in Delhi (1964-1969), teachers were retrained, impact evaluated and curriculum material revised.

9. In 1969, the pilot phase of the Science Education Project (SEP), assisted by UNESCO and UNICEF, started to implement the modified version of SSTP project at all levels of education in all the States/UTs. For the first time, such a huge project of developing curriculum materials, producing science kits, instructional materials, training of teachers, and implementation at all levels of school throughout India was taken up to cover 500,000 schools, 25,000,000 teachers and 87,000,000 students. The success, as also the limitation, of the project was itself a big experience in implementing the future projects both for India and UNICEF.

Limitations of the project SEP were:

— The universal adoption of curriculum materials raised problems of in-service training, of producing curriculum materials and supply of kits on a gigantic scale.

— Shortage of place and inadequate capability resulted in non-utilisation of apparatus. The apparatus supplied by UNICEF was not even unwrapped in the many training colleges.

— The preparation of instructional materials in various regional languages restricted the pace of implementation of the programme.

— For the manufacture and supply of kits to schools under the universal introduction of the SEP programme, States were facing the huge task of providing funds.

— The States wishing to introduce new courses more widely were required to do it in a phased and realistic manner; until that was achieved, the very objective of the project, namely the development of 'scientific attitude' and 'scientific literacy', would not be realised. However, the States/UTs Goa and Chandigarh, did not take up the first phase of the project at all as their education systems were similar to the adjacent bigger states of Maharashtra and Punjab respectively. They used the experience of the pilot projects in the adjoining States and implemented the wider phase straight away. There were lots of gaps in the lines of communication among the States and between the Centre and the States. As such, many of the officers in the Ministry of the States that were involved in the project knew very little about the scheme.

The achievements of this project are:

— Many teachers who had not studied science subjects in the higher secondary school could, after training, handle apparatus, improvise apparatus, develop science charts, and use scientific methods by duplicating the apparatus.

— NCERT could handle the development of science curriculum by the discovery approach, teachers' guide, laboratory manual and science kits suitable for demonstration in the disciplines of science in both the variants.

— Students enjoyed their science "learning by doing".

— Some measure of uniformity and improvement was achieved in science content.

— An effective State level leadership in science education was developed.

10. From the implementation of NHEES Projects (1975-1989), it is apparent that: The project NHEES showed that the problems of Nutrition, Health and Environment could be solved and the quality of life improved by intervention of the project in the school and community, even though the implementation of the project was tardy and uneven.

For the first time, a new attempt was made to produce a broadbased and comprehensive Curriculum Guide on "Nutrition, Health, Education and Environmental Sanitation" at the primary stage within the framework of the National Curriculum of 10 years school. Though the Guide had been developed to cater to the immediate needs of the Regional Centres and future needs of the various States/UTs which were going to take up the project, it was found very useful for curriculum planners and evaluators, the text book writers, teacher educators, supervisors and class room teachers.

The summary statement of the yearly budget allocation and the expenditure incurred in organising project activities showed that the average PUR (1980-84) was 47.9%, when the project was implemented in the 15 States. The average PUR for the period (1985-89) in its expansion phase was 37.65%, much lower than before. The PUR during a decade of implementation points out that India was not able to utilise the funds for the project provided by UNICEF. The reasons for under-utilisation are not clear.

The intention of UNICEF/NCERT in asking the states to spend from their own state budgets, which would be reimbursed later by the UNICEF, was to make states feel more responsible in implementing the project. The bureaucratic red tape in creating the budget head of accounts for innovative projects in the state sector and the difference in the financial year system followed by UNICEF and States created delay in getting funds and resulted in tardy implementation of the project.

The administration and management problems overwhelmed the academically sound programmes.The only state, which figured throughout the project period (1975-89), was Tamil Nadu, the state that felt the need and sowed the seed for the project NHEES.

11. The project "Improved Science Education in Primary & Middle Schools in MP & UP" taken up with German collaboration was helpful:

(a) In the development and production of appropriate technology of high quality and cost effective science kits for primary schools in rural areas.

(b) In the development of Teacher Hand Book (THB) to go with the kits.

(c) In increasing the capabilities of state workshops in MP and UP and NCERT, in producing science kits.

(d) In knowledge gains in advanced plastic technology.

(e) In encouraging small scale entrepreneurs in producing simple items required in the science kits, thus ensuring them good market for their products.

(f) In making the process of learning Science a joyful experience to both students and teachers.

12. The Centre of Educational Technology (CET) established with the joint support of UNDP and UNESCO, was actively involved in the production of; Educational materials and Multi media package for the Satellite Instructional Television Experiment (SITE). In the year 1975, the programme telecast was used to teach science to 47000 primary teachers in 24 days, which otherwise would have taken 10 years.

During 1975-84, CET and educational technology cells in 11 states used a multi media package programme for teaching science to primary teachers. CET had produced school programmes to cover science syllabi for primary schools through well planned Educational Television (ETV) lessons, broadcast through INSAT. The programme made use of special teaching aids including films, tapes, slides, filmstrips and graphic aids prepared by Department of Teaching Aids (DTA). Apart from curricular topics, themes related to population, health and nutrition and environment were also broadcast through INSAT. The Central Institute of Educational Technology (CIET) set up in 1984 with the merger of CET and DTA of the NCERT generates educational software for children.

13. APEID programmes are oriented in helping the countries in relating science education to specific local needs linking it to real life situations, rural environment and using child's immediate environment and locally available materials for providing science experiences. APEID is helping in exchange of work experience gained in similar cultural background. APEID's activities are geared towards developing innovations for raising the quality of science and technology education through curriculum renewal with regard to methods, materials and evaluation, developing the competencies of science teachers and teacher educators, re-orienting school education in science and technology in response to modern emerging new technologies, promoting innovative methods and techniques for pre-service and in-service training of science teachers and encouraging co-operation network for mutual support and sharing experiences among countries, and also in the development and application of communication technologies in science and technology education.

APEID helps in promoting quality and efficiency in science and technology education and catalyses in-country activities, which assist in designing and implementing innovations and thus towards self-reliance.

Population Education

The following findings emerged from the analysis of data gathered on Population Education:

1. In the late 1960s, Population Education with emphasis on reorienting socio-cultural values and triggering modification of pro-natalist values was accepted as national strategy in family planning programme, since the family planning programme initiated in the 50s with its clinical approach did not bring in the desired results. The recommendations of the first National Seminar in 1969, which helped to conceptualise population education, got a boost from the recommendations of the Asian Regional Workshop held at Bangkok in the year 1970. The establishment of the Population Education cell in NCERT followed this.

2. The establishment of Population Education Service in the UNESCO Regional Office for Education in Asia & Pacific region in the year 1972 assisted the Indian Government through the provision of various forms of advisory services, the development of national competence and capabilities in various aspects of population education, the organisation of seminars and training workshops designed to solve crucial problems faced by the National Project in population education, the development of prototype curricular materials and facilitation of the flow of population education material and information within the countries in the region. It also assisted in conducting research and evaluation.

3. In the year 1980, NPEP was launched in two cycles, 1980-85 & 1986-90, with the technical assistance of UNESCO Regional Office at Bangkok and partially funded by UNFPA. The concept of population education has been integrated into school subjects at all levels, primary, secondary and higher secondary. Training of teachers and resource personnel, preparing teaching aids, resources books, instructional material, evaluation tools, video clips, films, audio-visual aids and plays, songs and games are being developed on a continuous basis. The concept of population education has been included in the curriculum of teacher training institutions and in the B.Ed. programme.

4. Towards the end of the first cycle of NPEP, the research and feedback findings brought forth the gaps and deficiencies in the demography-laden conceptual framework. Thus the need arose for reconceptualising population education, emphasising more on the needs of family and individuals, such as: (a) family welfare and family size (b) delayed marriage (c) responsible parenthood (d) population change and resource development (e) population related values and beliefs and (f) status of women. During the second cycle, the first reconceptualisation of population education focussing on the above theme was formulated and syllabus and textbooks for standard I to XII were revised.

5. The impact study 'Evaluation of the National Population Education Project (NPEP)' made by IIPS points out that:

(i) Population education cells are not equipped with trained personnel.

(ii) The contents on family size and its implications were not focussed well.

(iii) A larger gap was observed between the lessons developed by PEC and those integrated into the school textbooks.

(iv) A very low percentage of teachers was trained in POPED.

(v) Duration of training was inadequate.

(vi) The area of research and evaluation was found weak.

(vii) Lack of co-ordination existed among the Population Education unit in States/UTs and other agencies.

6. From the following one can infer that, in India, even though literacy increased from 16.74% in 1951 to 29.50% in 1971, it did not bring the birth rate down. On the contrary, it went up from 39.9 to 41.2 per thousand. During the 1970's, Population Education curriculum and instructional materials were developed and experimentally introduced in schools. The project NPEP was introduced in the year 1980 with the help of international co-operation. Between 1971 and 1991, the literacy rate increased from 29.50% to 52.21%. and there was a decline in birth rate from 41.20 per thousand to 28.00 per thousand, thus suggesting the impact of population education in brining down birth rate.

Trends in Literacy, Mortality and Fertility in India (1951-1971):

Year	*Birth Rate (per 1000)*	*Male Literacy (%)*	*Female Literacy (%)*	*Total Literacy (%)*
1951	39.9	25.0	7.9	16.74
1961	41.7	34.4	13.0	24.6
1971	41.2	39.5	18.7	29.5
1981	37.2	46.9	24.8	36.2
1991	28.0	64.13	39.29	52.21

7. Population Education, so far, is treated as incidental to information, education and communicating approach adopted under the broader population programme. So it tends to be directional and message oriented. This approach has not brought out clearly (a) the inter-relationship between population and development (b) the framework is not in tune with the existing curriculum framework of school education.

There is now a need for reconceptualising population education for the second time, reflecting reproductive rights and reproductive health, health and education, sustainable development, family structure and family role, highlighting the criticality of education as an essential ingredient for population stabilisation, adolescent education which will provide a comprehensive treatment to process of growing up, HIV/AIDS and Drug Abuse.

6.2 GENERALISATIONS/IMPLICATIONS

The above findings regarding the impact of international co-operation in education lead to the following generalisations:

(1) The findings of this study indicate that international co-operation in the areas of teacher education, science education and population education has had a mixed impact. The data do not lead to the conclusion that one area as a whole has experienced greater impact than the other. What comes out more clearly from the analysis of data is that certain specific innovations or projects have been institutionalised in the country and are here to stay. This is an indication of greater impact.

Within teacher education, for example, microteaching is no longer viewed as an American innovation. A number of teacher training institutions have made it an integral part of their programme, research studies have been conducted and modifications in its application are suggested from time to time. The same is true, though not entirely, of models of teaching. In contrast, the concept of a four-year integrated programme of teacher education does not seem to have been accepted at the national level as evidenced by its non-replication in most of the other teacher training institutions.

(2) The competence and credibility of prestigious institutions like NCERT, NCTE, UGC, NIEPA, for providing leadership in the fields of school education, teacher education, college education and planning and administration of education are largely the result of sustained international co-operation.

(3) NCERT has worked closely with national and international curriculum specialists, subject experts, pedagogues and teachers since its inception. As a result, one of the strongest thrusts of the NCERT is in the area of curriculum development and reform.

(4) Participation of international organisations like UNESCO, UNICEF, UNDP and UNFPA accelerated co-operative activities in science education at all levels of school education. India's young scientists and engineers, who are involved in Indianising and further developing space technology, nuclear power programmes, satellite launching facilities, satellite design and fabrication, missile development and software development for computers, who have earned international acclaim and honours, are all the products of school education during 1970s and 1980s. This indicates the significant impact international co-operation has made towards the development of science education.

(5) In science education, "Learning by doing approach or discovery approach" has stimulated learning of science in school children even in rural areas. International co-operation in the development of science kits for schools has enhanced the capability of our technicians and has generated sustainability. Indian technicians are helping other developing countries in training their technicians and developing science kits suitable to them.

(6) UNESCO and UNFPA have given a substantial thrust to conceptualisng population education, policy and programmes in India. The Population Education Service (PES) has assisted India in (a) pinpointing specific needs and areas in population education (b) awareness of and orientation to population education (c) planning population education programmes (d) implementing national programmes and (e) developing a reservoir of national expertise.

(7) Recent changes in societal awareness and concern about sex education and related issues, such as AIDS, have helped to strengthen the need for reconceptualising population education in schools.

(8) Objective and scientific treatment of population education in schools has brought awareness in children regarding the need for limiting family size, as a way to improve the quality of life. The students are progressively forming favourable attitudes toward population related values.

(9) Scholars and researchers emphasized the importance of regional co-operation during the early 1970s. Edger Faure et al (1972) in their book 'Learning to Be' suggested that: "Mutual assistance among the developing countries must be increased, especially among countries in the same geographical region"...and "... set up an international programme for educational innovation attached to UNESCO and placed under the control of a representative international body - a programme designed to help countries take a decisive step towards a renewal of their educational system". The ACEID has, since its inception, taken concrete steps to achieve both these goals.

10. Effective management is a major determinant of success or failure of international co-operation projects. H. M. Phillips "Educational Co-operation between Developed and Developing Countries" highlighted this. The fact that the science education project, which was well conceived, planned and implemented with reasonable success in the earlier phases ran into difficulties in its universalisation, supports the validity of Phillip's observation.

These generalisations regarding the impact of international co-operation in education provide insights that can have important implications for thinking about future initiatives in this area.

(a) Large-scale projects, requiring huge investments and supporting technology and materials, are less likely to be accepted, much less institutionalised. Even if such projects are accompanied by financial and material support, it is unlikely that this support will continue for all time. More often than not, such projects are abandoned when the support is curtailed or eliminated. These projects only survive and get institutionised, if they have a continued commitment of domestic resources.

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(b) Small-scale innovations that address specific and definable needs and come with necessary support structure are more likely to be accepted and replicated. The most important changes in education are incremental, they evolve over time. Any innovation that comes from abroad does not lend itself to a "crash programme" or "instant" approach.

(c) When a project is launched more because of an attractive offer of external assistance than because of the failure or ineffectiveness of an existing situation, it is hard to create the conditions necessary for the project's success.

(d) The success of an international co-operation project in education is determined more by the people who are responsible for implementing it than by those who negotiate the arrangement or even by the material resources provided. The wider the gap between those two groups (levels), the greater the risk of failure. It is more difficult to figure out how to implement a complex innovation or project in education than to be merely convinced about its promise and potential and expect practicing teachers to develop their own techniques of implementation. Non-recognition of this fact explains the failure of many good ideas of educational reform.

(e) The findings of this study seem to confirm what Peter Drucker has said about innovations in any field. "The fundamental conditions under which new ideas become successful and enduring innovations in any field are:- (i) they represent a solution that is clearly definable, is simple and includes a complete system for implementation and dissemination (ii) they start small and try to do one specific thing and (iii) knowledge-based innovations are least likely to succeed and can succeed only if all the needed knowledge is available."

6.3 RECOMMENDATIONS

6.3.1 FOR FURTHER RESEARCH

The overview of the present research study on the impact of international co-operation in school education in the selected areas has highlighted the need for further research, in the following fields:

(1) In-depth research study for standardisation of tools to measure the accountability and the social and professional responsibility of teachers.

(2) Research studies to assess the impact of international co-operation in education at university level, particularly in the fields of applied sciences such as agriculture, engineering and medical sciences.

(3) Research by teachers toward developing and validating their own integral pedagogical models of teaching.

(4) Research directed towards evolving state intervention mechanism and to creating a social environment essential for the overall welfare and dignified living of the aged population which is rapidly increasing.

6.3.2 FOR POLICY INITIATIVES

The findings as well as the conclusions based on those findings point out the need for certain policy initiatives. Some of these are as follows:

(1) While reconceptualising population education for the second time in the light of new emerging issues/concerns such as Aids, Drug Abuse, Aging Population, Sex Education, Family Life Education, Emancipation of Women, Population and Environment, the Work Experience, the knowledge and skill gained by other Asian countries with similar cultural/social backgrounds have to be drawn in with the assistance of international co-operation.

(2) Valuable operating experience acquired in the existing educational system will have to be given importance in the design and development of new educational projects. In order to derive superior schedule performance, superior design projects, better fulfilment of national goals and enhancement of the operability and success, continued integration of educationists, policy planning and teachers into the early phase of the project conceptualisation and planning at national level is to be ensured.

(3) Bureaucrats, particularly of finance departments of states, should also be involved in implementing the projects financed by international agencies, to avoid pitfalls in accounting systems and to ensure proper utilisation of funds provided.

(4) Utmost care and consideration should be given to the socio-economic structure of the society and aspiration and need of the people at large, while framing new educational projects, to circumvent failures. This is to ensure the success of the project and to avoid situations similar to the one developed while implementing the multipurpose school system.

(5) In the scenario of globalisation of Indian industry and commerce, education has to be seen as an infrastructure for industry. For framing a new national educational policy to meet the challenges in the emerging technological society, setting up of parliamentary scientific committee with distinguished educationists, scientists, planners, industrialists, environmentalists and policy makers is called for.

(6) The educational policy makers should encourage setting up of privately funded institutions, such as Homi Bhabha Centre for Science Education, to conduct research in school science education and to provide research support to schools. In the face of diminished funding for educational projects from international organisations, government should encourage the industries by appropriate structural mechanisms to contribute to the setting up of such institutions and their programmes, as they are the beneficiaries of scientific achievement and trained manpower.

(7) There appears to be a lot of in-breeding in the premier institutes like NCERT and shortage of talented people in the state counterparts such as SCERTs, SIEs and SISEs. Transmission and translation losses are also observed in implementing the national policy in the states. A suitable mechanism should be created for exchange of personnel between state institutes and national institutions and opportunities should be given to all, to have an exposure to science educational planners, scientists and educationalists of other nations.

(8) A central agency is to be set up to document international assistance and co-operation in educational activities, their objectives, implementation methods, evaluation and dissemination and to make it obligatory for the agencies utilising the international help and co-operation to evaluate the projects undertaken and report to the central agency/organisation.

6.3.3 FOR PROFESSIONAL PRACTICE

The success story of a few projects and programmes discussed in this research study reveal that professional attitude and competence are the cornerstones for their success. In the emerging educational scenario, education professionals have to:

(1) Develop diagnostic and remedial programmes in microteaching, to improve the skills of teaching in teacher trainees.

(2) Introduce school based and school complex based in-service programmes with one or two teachers highly competent and committed to serving as catalysts. Institutions of higher education and research should be accorded high priority in the programmes, in terms of expertise.

(3) Organise national and international seminars for teachers and teacher educators within the country on emerging issues in education, to enable participation of a large number of nationals.

(4) Co-opt the services of retired educationists, subject experts and scientists who have links with their counterparts in the world to draw upon their experience and advice in conceptualising a new educational policy and advising the government.

(5) Introduce some kind of evaluation of the teaching process both at teacher education level and in schools, to bring in the accountability of teachers.

(6) Introduce a planned and systematic in-service programme for teachers from both private and government schools to undergo training in models of teaching.

(7) Organise management programmes to enhance the managerial skills of educational administrators.

Impact of international co-operation in any field, more so in education, is hard to assess, given the complexity of variables involved. Educational outcomes do not lend themselves to quantification and measurement and do not manifest during a short period of time. Despite these limitations, this exploratory study has revealed some important facts and relationships that can contribute to improving the effectiveness of international co-operation in education in the future.

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